Hay and Pasture Crops

IMPORTANT NOTICE REGARDING THE USE OF CHLORPYRIFOS:

Alfalfa Hay Pests
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In all cases, follow the instructions on the pesticide label. The PNW Insect Management Handbook has no legal status, whereas the pesticide label is a legal document. Read the product label before making any pesticide applications. For alfalfa, harvest is defined as when the crop is cut.

Protect pollinators: See How to Reduce Bee Poisoning from Pesticides.

Pesticide resistance: Modes of action are important criteria in selecting insecticides so as to prevent the development of resistance to insecticides. Rotate chemicals with a different mode-of-action group number, and do not use products with the same mode-of-action group number more than twice per season. For example, pyrethroids have a group number of 3A; chemicals with a 3A group number should be alternated with chemicals that have a group number other than 3A. Mode of action groupings are assigned by IRAC (Insecticide Resistance Action Committee). For additional information, see their Web site at http://www.irac-online.org/.

Note: Products are listed in alphabetical order and not in order of preference or superiority of pest control. For all insecticides, use appropriate adjuvants and application methods to maximize efficacy.

Alfalfa hay—Alfalfa caterpillar
Colias eurytheme – also known as Orange Sulphur
Colias philodice – also known as Clouded Sulphur

Pest description and crop damage Adult is the common yellow butterfly with a black border on the wings. The caterpillar is green and covered with very short hairs. It is seldom a pest in the Pacific Northwest (http://bugguide.net/node/view/3248).

Sampling and thresholds Ten or more nonparasitized larvae per 90° sweep, sometimes called a straight-line sweep.

Management—chemical control
♦ alpha-cypermethrin (Fastac EC) at 0.014 to 0.025 lb ai/a. PHI 3 days for cutting or grazing. REI 12 hr. Retreatment interval 7 days. Do not exceed 0.075 lb ai/a per season.
♦ azadirachtin (Aza-Direct, Neemix 4.5)—See specific labels for rates. PHI 0 days. REI 4 hr. Aza-direct and Neemix 4.5 are OMRI-listed for organic use.
♦ Bacillus thuringiensis aizawai or kurstaki (numerous products) at 0.25 to 1.5 lb ai/a. PHI 0 days. REI 4 hr. Most effective on small caterpillars; use highest recommended rate for fully developed ones. Evening applications increase efficacy. A spreader sticker may improve performance. OMRI-listed for organic use. (Group 11A)
♦ beta-cyfluthrin (Baythroid XL) at 0.0125 to 0.022 lb ai/a. PHI 7 days for grazing or cutting. REI 12 hr. Do not exceed 0.044 lb ai/a per cutting or a total of 0.175 lb ai/a per season. Retreatment interval 5 days. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Group 3A)
♦ carbaryl (numerous products) at 1 lb ai/a. PHI 7 days for grazing or cutting. REI 12 hr. Do not apply more than once per cutting. Carbaryl may burn or yellow hay under some conditions, and applying to wet foliage or during high humidity may injure tender foliage. Use higher gallonage (up to 40 GPA) when canopy is dense. Carbaryl is extremely hazardous to bees, so do not apply when bees are foraging in the treatment area or nearby. Late-based formulations, such as Sevin XLR Plus, are less hazardous to bees. (Group 1A)
♦ chlorantraniliprole (Coragen, Prevathon) at 0.045 to 0.098 lb ai/a. PHI 0 days. REI 4 hr. Do not exceed 0.2 lb ai/a or 4 applications per year or 1 application per cutting. Chlorantraniliprole is considered a low risk to bees. Retreatment interval 3 days. (Group 28)
♦ chlorantraniliprole/lambda-cyhalothrin (Besiege) at 0.049 to 0.078 lb ai/a. PHI 1 day for forage and 7 days for hay. REI 24 hr. Minimum of 5 days between applications. Do not exceed 0.12 lb ai of products containing lambda-cyhalothrin or 0.2 lb ai of chlorantraniliprole-containing folic acid products per acre per growing season. Refer to product labels for application limits if products containing gamma-cyhalothrin and products containing lambda-cyhalothrin are to be used in the same season. Because of the pyrethroid component (lambda-cyhalothrin), this product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Groups 28 and 3A)
♦ chlorpyrifos (numerous products) at 0.5 to 1 lb ai/a. PHI (grazing or cutting) 7 days at 0.25 lb ai/a, 14 days at 0.5 lb ai/a, 21 days at rates above 0.5 lb ai/a. REI 24 hr. Do not apply any chlorpyrifos products more than four times per season or more than once per cutting. Do not reapply within 10 days of the first application. Certain products can be chemigated by sprinkler irrigation. Chlorpyrifos is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply chlorpyrifos or
allow it to drift to blooming crops if bees are visiting the treatment area. (Group 1B)

- chlorpyrifos/gamma cyhalothrin (Cobalt) at 0.26 to 0.52 lb total ai/a. PHI 14 days. REI 24 hr. Do not apply Cobalt nor any other product containing chlorpyrifos more than once per cutting nor more than 4 times per season. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Groups 1B and 3A) **RESTRICTED USE IN OREGON.**

- chlorpyrifos/zeta-cypermethrin (Stallion) at 0.12 ai/a (0.001 lb zeta-cypermethrin + 0.11 lb chlorpyrifos) to 0.275 ai/a (0.025 lb zeta-cypermethrin + 0.25 lb chlorpyrifos). PHI 7. REI 24 hr. Do not exceed 0.075 lb ai/a of products containing zeta-cypermethrin or 0.75 lb ai/a of chlorpyrifos-containing products per acre per growing season. Do not apply this product or any other product containing chlorpyrifos more than 4 times per season. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Groups 1B and 3A) **RESTRICTED USE IN OREGON.**

- Chromobacterium subtilis (Grandeo) at 0.3 to 0.9 lb ai/a per 100 gal. PHI 0 days. REI 4 hr. OMRI-listed for organic use.

- cyfluthrin (Tombstone) at 0.25 to 0.44 lb ai/a. PHI 7 days for grazing or cutting. REI 12 hr. Retreatment interval 5 days. Do not exceed 0.088 lb ai/a per cutting or a total of 0.35 lb ai/a per season. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Group 3A)

- cypermethrin (Declare) at 0.0075 to 0.0125 lb ai/a. PHI 1 day for forage harvest or 7 days for hay harvest. REI 24 hr. Do not exceed 0.015 lb ai/a per cutting or 0.06 lb ai/a per season. Refer to product labels application limits if products containing gamma-cypermethrin and products containing lambda-cyhalothrin are to be used in the same season. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Group 2A)

- indoxacarb (Steward) at 0.065 to 0.11 lb ai/a. PHI 7 days for cutting. REI 12 hr. Do not exceed one application per cutting or 0.44 lb ai/a per season. May be applied to alfalfa through overhead sprinkler systems. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Group 3A)

- lambda-cyhalothrin (Warrior II) at 0.015 to 0.025 lb ai/a. PHI 1 day for forage harvest, 7 days for hay harvest. REI 24 hr. Apply only to pure stands of alfalfa. Do not exceed 0.03 lb ai/a per cutting or 0.12 lb ai/a per season. Refer to product labels for application limits if products containing gamma-cyhalothrin and products containing lambda-cyhalothrin are to be used in the same season. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Group 3A)

- malathion (Fyfanon ULV) at 0.61 lb ai/a. PHI 0 days. REI 12 hr. Do not exceed 2 applications per cutting and maintain a minimum 14 day interval between applications. ULV formulations are the only ones labeled for this pest. Not effective below 65°F. This pesticide is highly toxic to bees exposed to direct treatment on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops or weeds while bees are actively visiting the treatment area. (Group 1B)

- methomyl (Lannate LV; other products) at 0.45 to 0.9 lb ai/a. PHI 7 days for grazing or cutting. REI 48 hr. Do not apply more than 10 times per season or exceed 3.6 lb ai/a per season. Direct exposure to methomyl is highly toxic to bees. Do not apply or allow drift to blooming crops or weeds while bees are actively visiting the treatment area. (Group 1A)

- methoxyfenozide (Intrepid 2F) at 0.06 to 0.12 lb ai/a. PHI 0 days for grazing or cutting, 7 days of harvest. REI 4 hr. Do not apply more than once per cutting. Do not apply more than 0.5 lb ai/a per year. (Group 18)

- permethrin (numerous products) at 0.05 to 0.2 lb ai/a. PHI 0 days for grazing or cutting, 7 days of harvest. REI 12 hr. Do not exceed 0.2 lb ai/a per cutting. Retreatment interval 30 days. Permethrin is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply or allow to drift to blooming crops if bees are visiting the treatment area. (Group 3A)

- zeta-cypermethrin at 0.028 to 0.05 lb ai/a (Mustang Maxx), or at 0.014 to 0.025 lb ai/a (Mustang Maxx). PHI 3 days for forage or grazing, 7 days for harvesting seed. REI 12 hr. Retreatment interval 7 days. Do not apply more than 0.1 lb ai/a per cutting or more than 0.3 lb ai/a per season (Mustang) or 0.05 lb ai/a per cutting or 0.15 lb ai/a per season (Mustang Maxx). These products are highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Group 3A)

**Alfalfa hay—Alfalfa and/or cabbage looper**

*Autographa californica* and *Trichoplusia ni*

**Pest description and crop damage** The adult moth is gray to light brown, and the front wing has a white teardrop-shaped mark. Larvae have three pairs of abdominal prolegs, two pairs in the middle of the abdomen and one pair of anal prolegs, are light green, and have a pale head. Fully developed larvae are about 1 inch long and move in a looping, or “inchworm,” fashion. Larvae rarely need chemical control in alfalfa. For additional information, see: [https://horticulture.oregonstate.edu/oregon-vegetables/cabbage-looper-alfalfa-looper](https://horticulture.oregonstate.edu/oregon-vegetables/cabbage-looper-alfalfa-looper).

**Sampling and thresholds** Ten or more nonparasitized larvae per 90° sweep, sometimes called a straight-line sweep.

**Management—chemical control**

- alpha-cypermethrin (Fastac EC) at 0.014 to 0.025 lb ai/a. PHI 3 days of cutting or grazing. REI 12 hr. Retreatment interval 7 days. Do not exceed 0.075 lb ai/a per season.

- azadirachtin (Aza-Direct, Neemix 4.5). See specific labels for rates. PHI 0 days. REI 4 hr. Aza-direct and Neemix 4.5 are OMRI-listed for organic use.

- *Bacillus thuringiensis* (numerous products) at 0.25 to 1.5 lb ai/a. PHI 0 days. REI 4 hr. Most effective on small caterpillars; use highest labeled rate for large larvae. Evening applications increase efficacy. A spreader sticker may improve performance. OMRI-listed for organic use. (Group 11)

- beta-cyfluthrin (Baythroid XL) at 0.0065 to 0.022 lb ai/a. PHI 7 days for grazing or cutting. REI 12 hr. Do not exceed 0.044 lb ai/a per cutting or 0.175 lb ai/a per season. Retreatment interval 5 days. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Group 3A)

- chlorantraniliprole (Coragen, Prevathon) at 0.045 to 0.098 lb ai/a. PHI 0 days. REI 4 hr. Do not exceed 0.2 lb ai/a or 4 applications per year or 1 application per cutting. Chlorantraniliprole is considered a low risk to bees. Retreatment interval 3 days. (Group 28)
♦ chlorantraniliprole/lambda-cyhalothrin (Besiege) at 0.049 to 0.078 lb ai/a. PHI 1 day for forage and 7 days for hay. REI 24 hr. Minimum of 5 days between applications. Do not exceed 0.12 lb ai of products containing lambda-cyhalothrin or 0.2 lb ai of chlorantraniliprole-containing foliar products per acre per growing season. Refer to product labels for application limits if products containing gamma-cyhalothrin and products containing lambda-cyhalothrin are to be used in the same season. Because of the pyrethroid component (lambda-cyhalothrin), this product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Groups 28 and 3A)

♦ chlorpyrifos (numerous products) at 0.5 to 1 lb ai/a. PHI (grazing or cutting) 7 days at 0.25 lb ai/a, 14 days at 0.5 lb ai/a, 21 days at rates above 0.5 lb ai/a. REI 24 hr. Do not apply any chlorpyrifos products more than four times per season or more than once per cutting. Do not reapply within 10 days of the first application. Certain products can be chemigated by sprinkler irrigation. Chlorpyrifos is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply chlorpyrifos or allow it to drift to blooming crops if bees are visiting the treatment area. (Group 1B) **RESTRICTED USE IN OREGON.**

♦ chlorpyrifos/gamma cyhalothrin (Cobalt) at 0.38 to 0.76 lb ai/a. PHI 14 at low rate to 21 days at 0.52 lb ai/a or above. REI 24 hr. Do not apply Cobalt or any other product containing chlorpyrifos more than once per cutting nor more than 4 times per season. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Groups 1B and 3A) **RESTRICTED USE IN OREGON.**

♦ chlorpyrifos/zeta-cypermethrin (Stallion) at 0.12 ai/a (0.001 lb zeta-cypermethrin + 0.11 lb chlorpyrifos) to 0.275 ai/a (0.025 lb zeta-cypermethrin + 0.25 lb chlorpyrifos). PHI 7. REI 24 hr. Do not exceed 0.075 lb ai of products containing zeta-cypermethrin or 0.75 lb ai of chlorpyrifos-containing products per acre per growing season. Do not apply this product or any other product containing chlorpyrifos more than 4 times per season. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Groups 1B and 3A) **RESTRICTED USE IN OREGON.**

♦ cyfluthrin (Tombstone) at 0.013 to 0.044 025 lb ai/a. PHI 7 days for grazing or cutting. REI 12 hr. Retreatment interval 5 days. Do not exceed 0.088 lb ai/a per cutting or 0.35 lb ai/a per season. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Group 3A)

♦ gamma-cyhalothrin (Declare) at 0.0075 to 0.0125 lb ai/a. PHI 1 day for forage harvest or 7 days for hay harvest. REI 24 hr. Do not exceed 0.015 lb ai/a per cutting or 0.06 lb ai/a per season. Refer to product labels application limits if products containing gamma-cyhalothrin and products containing lambda-cyhalothrin are to be used in the same season. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. Do not flood irrigate within 24 hr following an application (Group 3A)

♦ indoxacarb (Steward) at 0.065 to 0.11 lb ai/a. PHI 7 days for cutting. REI 12 hr. Do not exceed one application per cutting or 0.44 lb ai/a per season. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. May be applied to alfalfa through overhead sprinkler systems. (Group 22A)

♦ lambda-cyhalothrin (Warrior II) at 0.015 to 0.025 lb ai/a. PHI 1 day for forage harvest or 7 days for hay harvest. REI 24 hr. Apply only to pure stands of alfalfa. Do not exceed 0.03 lb ai/a per cutting or 0.12 lb ai/a per season. Refer to product labels for application limits if products containing gamma-cyhalothrin and products containing lambda-cyhalothrin are to be used in the same season. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Group 3A)

♦ methomyl (Lannate LV) at 0.45 to 0.9 lb ai/a. PHI 7 days for grazing or cutting. REI 48 hr. Do not apply more than 10 times per season or exceed 3.6 lb ai/a per season. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Group 1A)

♦ methoxyfenozide (Intrepid 2F) at 0.06 to 0.12 lb ai/a. PHI 0 days for graze/forage, 7 days hay. REI 4 hr. Do not apply more than once/ cutting. Do not apply more than 0.5 lb ai/a per year. (Group 18)

♦ permethrin (numerous products) at 0.05 to 0.2 lb ai/a. For use on pure alfalfa stands only. PHI 0 days at 0.1 lb ai/a rate, 14 days if more than 0.1 lb ai/a is used. PHI 12 hr. Do not exceed 0.2 lb ai/a per cutting. Retreatment interval 30 days. Permethrin is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Group 3A)

♦ spinosad (Entrust SC) at 0.031 to 0.063 lb ai/a. PHI 0 days forage; 3 days hay or fodder. REI 4 hr. Do not exceed 0.186 lb ai/a per season. Do not exceed 6 applications per season. This product is toxic to bees exposed to treatment for 3 hours following treatment. Do not apply this pesticide to blooming, pollen-shedding or nectar-producing parts of plants if bees may forage on the plants during this time period. Entrust is OMRI-listed for organic use. (Group 5)

♦ zeta-cypermethrin at 0.028 to 0.05 lb ai/a (Mustang), or at 0.014 to 0.025 lb ai/a (Mustang Maxx). PHI 3 days for cutting or grazing, 7 days for harvesting seed. REI 12 hr. Retreatment interval 7 days. Do not use more than 0.1 lb ai/a per cutting or more than 0.3 lb ai/a per season (Mustang) or 0.05 lb ai/a per cutting or 0.15 lb ai/a per season (Mustang Maxx). These products are highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Group 3A)

**Alfalfa hay—Alfalfa weevil**

*Hypera postica*

**Pest description and crop damage** Larvae are about 0.375 inch long, yellow to green, with a white stripe down the back. They feed in and on the buds and leaves of alfalfa. For additional information on their biology and management, see: [http://extension.usu.edu/files/publications/factsheet/alfalfa-weevils89.pdf](http://extension.usu.edu/files/publications/factsheet/alfalfa-weevils89.pdf)

**Sampling and thresholds**

**Treat when—**

1. Thirty percent of plant terminals show feeding damage. Either cut and then treat stubble or treat the standing crop, depending on how close to cutting it is.
2. Damage is noticeable 1 week or more before estimated cutting time, and larvae exceed 10 per 90° sweep, sometimes called a straight-line sweep.
3. Larvae number 20 or more per sweep (180° sweep, sometimes called a half-circle sweep). Thresholds based on larvae per sweep are a general guideline; weather, plant vigor, irrigation schedules, cutting date, history of weevils in the area, and a complex of other factors should be considered in making treatment decisions.
Management—chemical control

Most of these insecticides are hazardous to bees and should not be applied if bees are actively foraging in the alfalfa.

- alpha-cypermethrin (Fastac EC) at 0.014 to 0.025 lb ai/a. PHI 3 days of cutting or grazing. REI 12 hr. Retreatment interval 7 days. Do not exceed 0.075 lb ai/a per season.

- beta-cyfluthrin (Baythroid XL) at 0.0125 to 0.022 lb ai/a. PHI 7 days for grazing or cutting. REI 12 hr. Retreatment interval 5 days. Do not exceed 0.044 lb ai/a per cutting or 0.175 lb ai/a total per season. (Group 3A)

- carbaryl (numerous products) at 1 to 1.5 lb ai/a. PHI 7 days for grazing or cutting. REI 12 hr. If pretreatment damage is extensive, cut alfalfa and treat the stubble for alfalfa weevil larvae. This product is not effective against adult alfalfa weevils. Do not apply more than once per cutting. Carbaryl may burn or yellow hay under some conditions, and applying to wet foliage or during high humidity may injure tender foliage. Latex-based formulations, such as Sevin XLR Plus, are less hazardous to bees. (Group 1A)

- chlorantraniliprole/lambda-cyhalothrin (Besiege) at 0.059 to 0.088 lb ai/a. PHI 1 day for forage and 7 days for hay. REI 24 hr. Minimum of 5 days between applications. Do not exceed 0.12 lb ai of products containing lambda-cyhalothrin or 0.2 lb ai of chlorantraniliprole-containing foliar products per acre per growing season. (Groups 28 and 3A)

- chlorpyrifos (numerous products) at 0.5 to 1 lb ai/a. PHI for grazing or cutting is 7 days at 0.25 lb ai/a or 14 days at 0.5 lb ai/a or 21 days at rates above 0.5 lb ai/a. REI 24 hr. Do not apply any chlorpyrifos products more than four times per season or more than once per cutting. Do not reapply within 10 days of the first application. Certain products can be chemigated by sprinkler irrigation. Minor phytotoxicity is possible on new growth. (Group 1B)

RESTRICTED USE IN OREGON.

- chlorpyrifos/gamma-cyhalothrin (Cobalt) at 0.38 to 0.76 lb ai/a. PHI 14 days at low rate to 21 days at 0.62 lb ai/a or above. REI 1 day. Do not apply Cobalt or any other product containing chlorpyrifos more than once per cutting nor more than 4 times per season. Refer to product labels for application limits if products containing gamma-cyhalothrin and products containing lambda-cyhalothrin are to be used in the same season. (Groups 1B and 3A)

RESTRICTED USE IN OREGON.

- chlorpyrifos/zeta-cypermethrin (Stallion) at 0.12 ai/a (0.001 lb zeta-cypermethrin + 0.11 lb chlorpyrifos) to 0.275 ai/a (0.025 lb zeta-cypermethrin + 0.25 lb chlorpyrifos). PHI 7. REI 24 hr. Do not exceed 0.075 lb ai of products containing zeta-cypermethrin or 0.75 lb ai of chlorpyrifos-containing products per acre per growing season. Do not apply this product or any other product containing chlorpyrifos more than 4 times per season. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Groups 1B and 3A)

RESTRICTED USE IN OREGON.

- cyfluthrin (Tombstone) at 0.025 to 0.044 lb ai/a. PHI 7 days for grazing or cutting. REI 12 hr. Retreatment interval 5 days. Do not exceed 0.088 lb ai/a per cutting or 0.35 lb ai/a total per season. (Group 3A)

- gamma-cyhalothrin (Declare) at 0.01 to 0.015 lb ai/a. PHI 1 day for forage harvest or 7 days for hay harvest. REI 24 hr. Do not exceed 0.015 lb ai/a per cutting or 0.06 lb ai/a per season. Refer to product labels for application limits if products containing gamma-cyhalothrin and products containing lambda-cyhalothrin are to be used in the same season. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Group 3A)

- GS-omega/kappa-Hxtx-Hv1a (Spear Biological) at 0.2 to 0.8 lb ai/a. PHI 0 days. REI 4 hr. Do not exceed 2 lb ai/a per year.

- indoxacarb (Steward) at 0.065 to 0.11 lb ai/a. PHI 7 days for cutting. REI 12 hr. Larval control only. Do not exceed one application per cutting or 0.44 lb ai/a total per season. May be applied to alfalfa through overhead sprinkler systems (Group 22A)

- lambda-cyhalothrin (Warrior II) at 0.02 to 0.03 lb ai/a. PHI 1 day for forage harvest or 7 days for hay harvest. REI 24 hr. Apply only to pure stands, avoid applications when bees are actively foraging. Do not exceed 0.03 lb ai/a per cutting or 0.12 lb ai/a per season. Refer to product labels for application limits if products containing gamma-cyhalothrin and products containing lambda-cyhalothrin are to be used in the same season. (Group 3A)

- malathion (numerous products) at 1 to 1.25 lb ai/a. PHI 0 days. REI 12 hr. Larvae only. Not effective below 65°F. Do not exceed 2 applications per cutting and maintain a minimum 14 day interval between applications. (Group 1B)

- methomyl (Lannate LV; other products) at 0.9 lb ai/a. PHI 7 days for grazing or cutting. REI 48 hr. Effective on larvae only. Do not exceed 10 applications per season or 3.6 lb ai/a total in one season. (Group 1A)

- permethrin (numerous products) at 0.1 to 0.2 lb ai/a. PHI 0 days at 0.1 lb ai/a or less, 14 days at more than 0.1 lb ai/a. PHI 12 hr. Do not exceed 0.2 lb ai/a per cutting. Retreatment interval 30 days. (Group 3A)

- phosmet (Imidan 70-W) at 0.7 to 1 lb ai/a. PHI 7 days for grazing or cutting. REI 5 days. Do not apply more than once per cutting. Do not apply during bloom. Do not use latex- or pineoleone-based adjuvants. (Group 1B)

- spinosad (Entrust SC) at 0.031 to 0.063 lb ai/a. PHI 0 days forage; 3 days hay or fodder. REI 4 hr. Only for suppression of alfalfa weevil larvae. Do not exceed 0.186 lb ai/a per season. Do not exceed 6 applications per season. Entrust is OMRI-listed for organic use. (Group 5)

- zeta-cypermethrin at 0.028 to 0.05 lb ai/a (Mustang), or at 0.014 to 0.025 lb ai/a (Mustang Maxx). PHI 3 days for cutting or grazing, 7 days for harvesting seed. REI 12 hr. Retreatment interval 7 days. Do not use more than 0.1 lb ai/a per cutting or more than 0.3 lb ai/a per season (Mustang) or 0.05 lb ai/a per cutting or 0.15 lb ai/a per season (Mustang Maxx). These products are highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Group 3A)

Alfalfa hay—Aphid

Includes

Alfalfa aphid (Macrosiphum creelii)
Blue alfalfa aphid (Acyrthosiphon kondoi)
Pea aphid (Acrystosiphon pisum)
Spotted alfalfa aphid (Theroaphis maculata)

Pest description and crop damage

Aphids are common on legumes. Aphids can frequently cause problems when their natural enemies are eliminated by sprays targeting alfalfa weevil. Border harvesting or strip cutting can help preserve natural enemies for aphids and other pests. Aphids feed by sucking juices from leaves, stems, and pods. Large populations reduce plant vigor. Aphids secrete honeydew that can promote a black sooty mold and decrease photosynthesis. Aphids may also transmit viruses to alfalfa, including Alfalfa mosaic virus and others. The pea aphid is “large” and can be green or red. The spotted alfalfa aphid is small and pale yellow or grayish, with conspicuous dark spots on the abdomen. It often is on the lower plant and can seriously damage some varieties. Correct species identification is critical for optimal control. Damage thresholds are lower for blue alfalfa aphid than for pea aphid. The
following guide provides easy to use diagnostics for key pest aphid species:

http://diagnostics.montana.edu/Insect/topics/AphidMtGuide.pdf.

Contact your local extension office for assistance with identification. For additional information, see: http://www.extension.uidaho.edu/forage/Proceedings/2004%20Proceedings%20pdf/Insect%20pests%20in%20Forage.pdf.

Sampling and thresholds

Treat for pea aphid when:
1. The population approaches 100 per sweep and plants are less than 1 ft high. Blue alfalfa aphid may cause damage at levels lower than 100 aphids per sweep.
2. The field is about 2 weeks or more from cutting or is under water stress, as evidenced by wilting plants.
3. Predators and parasites are not controlling the aphids.

Treat for spotted alfalfa aphid when:
4. Aphids average 10 or more per stem, and honeydew is noticeable. Seedling stands are most susceptible and can be damaged seriously even by relatively few aphids.

Management—biological control

Several species of predatory beetles, bugs and flies, and parasitic wasps occur in alfalfa and can maintain aphid populations below damaging levels. Insecticides often destroy such beneficial insects, leading to severe outbreaks of aphids and other pests. A field guide of important natural enemies of aphids and other pests is available at: http://ipmnet.org/Pocket_Guide_of_Natural_Enemies.pdf. Information on which pesticides are most compatible with natural enemies can be found at: http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn74140.html#TABLE4 or by contacting your local extension office.

Management—cultural control

Certain commercial cultivars have resistance to aphids. Consult seed company representatives or your local extension office for recommendations. Information is also available from the National Alfalfa and Forage Alliance (http://www.alfalfa.org/).

Management—chemical control

Most of the following insecticides are hazardous to bees and should not be used if bees are foraging in the alfalfa.

♦ azadirachtin (Aza-Direct, Neemix 4.5)—See specific labels for rates. PHI 0 days. REI 4 hr. Aza-direct and Neemix 4.5 are OMRI-listed for organic use.

♦ Beauveria bassiana GHA (Mycotrol ESO) at 0.5 to 2 quarts/100 gal. PHI 0 days. REI 4 hr. OMRI-listed for organic use.

♦ chlorantraniliprole/lambdacyhalothrin (Besiege) at 0.059 to 0.088 lb ai/a. PHI 1 day for forage and 7 days for hay. REI 24 hr. Minimum of 5 days between applications. Do not exceed 0.12 lb ai of products containing lambda-cyhalothrin or 0.2 lb ai of chlorantraniliprole-containing foliar products per acre per growing season. Refer to product labels for application limits if products containing gamma-cyhalothrin and products containing lambda-cyhalothrin are to be used in the same season.

♦ chlorpyrifos (numerous products) at 0.5 to 1 lb ai/a. PHI grazing or cutting is 7 days at 0.25 lb ai/a; 14 days at 0.5 lb ai/a; 21 days at rates greater than 0.5 lb ai/a. REI 24 hr. Generally only for suppression of aphids rather than control. Do not apply any chlorpyrifos products more than four times per season or more than once per cutting. Do not reapply within 10 days of the first application. Certain products can be chemigated by sprinkler irrigation. Highly toxic to bees exposed to direct treatment and should not be applied when bees are foraging in the treated area. Minor phytotoxicity is possible on new growth. (Group 1B)

RESTRICTED USE IN OREGON.

♦ chlorpyrifos/gamma cyhalothrin (Cobalt) at 0.26 to 0.52 lb ai/a. PHI 14 days. REI 1 day. Do not apply Cobalt nor any other product containing chlorpyrifos more than once per cutting nor more than 4 times per season. Refer to product labels for application limits if products containing gamma-cyhalothrin and products containing lambda-cyhalothrin are to be used in the same season. Highly toxic to bees when exposed to direct treatment. Do not apply if nearby bees are clustered outside of hives and bees are foraging in an area to be treated. (Groups 1B and 3A)

RESTRICTED USE IN OREGON.

♦ chlorpyrifos/zeta-cypermethrin (Stallion) at 0.12 ai/a (0.001 lb zeta-cypermethrin + 0.11 lb chlorpyrifos) to 0.275 ai/a (0.025 lb zeta-cypermethrin + 0.25 lb chlorpyrifos), PHI 7. REI 24 hr. Do not exceed 0.075 lb ai of products containing zeta-cypermethrin or 0.75 lb ai of chlorpyrifos-containing products per acre per growing season. Do not apply this product or any other product containing chlorpyrifos more than 4 times per season. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Groups 1B and 3A)

♦ flupyradifurone (Sivanto 200) at 0.09 to 0.137 lb ai/a. PHI 7 days for grazing or cutting. REI 48 hrs. Do not apply during bloom. Do not exceed one application per cutting. Do not exceed 0.5 lb ai/a per season. Highly toxic to bees. Restrict application to the period after dark when bees are inside the hive or in the early morning before the bees are foraging in the fields. (Group 1B)

♦ lambda-cyhalothrin (Warrior II) at 0.02 to 0.03 lb ai/a. PHI 1 day for forage harvest or 7 days for hay harvest. REI 24 hr. Do not exceed 0.015 lb ai/a per cutting or 0.06 lb ai/a per season. Refer to product labels application limits if products containing gamma-cyhalothrin and products containing lambda-cyhalothrin are to be used in the same season. (Group 3A)

♦ methomyl (Lannate LV; numerous other products) at 0.45 to 0.9 lb ai/a. PHI 7 days for grazing or cutting. REI 48 hr. Do not exceed 2 applications per cutting, or 10 applications or 3.6 lb ai/a per season. (Group 1A)

♦ permethrin (numerous products) at 0.05 to 0.2 lb ai/a. PHI 0 days at 0.1 lb ai/a or less, 14 days at more than 0.1 lb ai/a. REI 12 hr. Do not exceed 0.2 lb ai/a per cutting. Retreatment interval 30 days. (Group 3A)
sodium borate (Prev-Am Ultra) at 50 fl oz/100 gal. PHI 1 day. REI 4 hr. Retreatment interval 7 days.

thiamethoxam (Cruiser 5FS / 5FS Alfalfa – seed treatment) at 0.001 milligrams per seed. Will protect young alfalfa seedlings from damage caused by aphids for the first cut only. (Group 4A)

zeta-cypermethrin at 0.028 to 0.05 lb ai/a (Mustang), or at 0.014 to 0.025 lb ai/a (Mustang Maxx). PHI 3 days for cutting or grazing, 7 days for harvesting seed. REI 12 hr. Retreatment interval 7 days. Do not use more than 0.1 lb ai/a per cutting or more than 0.3 lb ai/a per season (Mustang) or 0.05 lb ai/a per cutting or 0.15 lb ai/a per season (Mustang Maxx). These products are highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Group 3A)

Alfalfa hay—Armyworm

Includes
Bertha armyworm (Mamestra configurata)
Western yellowstriped armyworm (Spodoptera praefica)

Pest description and crop damage Larvae vary in size and color; usually they are 1.5 to 2 inches long at maturity. Armyworms are pests of most legume hay crops.

Management—chemical control

alpha-cypermethrin (Fastac EC) at 0.0175 to 0.025 lb ai/a. PHI 3 days of cutting or grazing. REI 12 hr. Retreatment interval 7 days. Do not exceed 0.075 lb ai/a per season. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Group 3A)
azadirachtin (Aza-Direct, Neemix 4.5)—See specific labels for rates. PHI 0 days. REI 4 hr. Aza-direct and Neemix 4.5 are OMRI-listed for organic use.

Bacillus thuringiensis (numerous products) at 0.25 to 1.5 lb product/a. PHI 0 days. PHI 4 hr. Most effective on small caterpillars; use highest recommended rate for fully developed ones. Evening applications increase efficacy. A spreader-sticker may improve performance. OMRI-listed for organic use. (Group 11)

beta-cyfluthrin (Baythroid XL) at 0.0125 to 0.022 lb ai/a. PHI 7 days for grazing or cutting. Only effective on small larvae. REI 12 hr. Retreatment interval 5 days. Do not exceed 0.044 lb ai/a per cutting or 0.175 lb ai/a total per season. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Group 3A)
carbaryl (numerous products) at 1 to 1.5 lb ai/a. PHI 7 days for grazing or cutting. REI 12 hr. Do not apply more than once per cutting. Carbaryl may burn or yellow hay under some conditions, and applying to wet foliage or during high humidity may injure tender foliage. Carbaryl is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply carbaryl or allow it to drift to blooming crops if bees are visiting the treatment area. Latex-based formulations, such as Sevin XLR Plus, are less hazardous to bees. (Group 1A)

chlorantraniliprole (Coragen, Prevathon) at 0.045 to 0.098 lb ai/a. PHI 0 days. REI 4 hr. Do not exceed 0.2 lb ai/a or 4 applications per year or 1 application per cutting. Chlorantraniliprole is considered a low risk to bees. Retreatment interval 3 days. (Group 28)

chlorantraniliprole/lamba-cyhalothrin (Besiege) at 0.049 to 0.078 lb ai/a. PHI 1 day for forage and 7 days for hay. REI 24 hr. Minimum of 5 days between applications. Do not exceed 0.12 lb ai of products containing lambda-cyhalothrin or 0.2 lb ai of chlorantraniliprole-containing foliar products per acre per growing season. Refer to product labels for application limits if products containing gamma-cyhalothrin and products containing lambda-cyhalothrin are to be used in the same season. Because of the pyrethroid component (lambda-cyhalothrin), this product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Groups 28 and 3A)

chlorpyrifos (numerous products) at 0.5 to 1 lb ai/a. PHI for grazing or cutting is 7 days at 0.25 lb ai/a or 14 days at 0.5 lb ai/a. PHI 24 hr. Do not apply more than four times per season or more than once per cutting. Do not reapply within 10 days of an earlier application. Minor phytotoxicity possible on new growth. Chlorpyrifos is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply chlorpyrifos or allow it to drift to blooming crops if bees are visiting the treatment area. (Group 1B) RESTRICTED USE IN OREGON.

clorpyrifos/gamma cyhalothrin (Cobalt) at 0.38 to 0.76 lb ai/a. PHI 14 days at low rate to 21 days at rates above 0.52 lb ai/a. REI 24 hr. Do not apply Cobalt nor any other product containing chlorpyrifos more than once per cutting nor more than 4 times per season. Refer to product labels for application limits if products containing gamma-cyhalothrin and products containing lambda-cyhalothrin are to be used in the same season. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Groups 1B and 3A)—RESTRICTED USE IN OREGON.

clorpyrifos/zeta-cypermethrin (Stallion) at 0.12 ai/a (0.001 lb zeta-cypermethrin + 0.11 lb chlorpyrifos) to 0.275 ai/a (0.025 lb zeta-cypermethrin + 0.25 lb chlorpyrifos). PHI 7. REI 24 hr. Do not exceed 0.075 lb ai of products containing zeta-cypermethrin or 0.75 lb ai of chlorpyrifos-containing products per acre per growing season. Do not apply this product or any other product containing chlorpyrifos more than 4 times per season. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Groups 1B and 3A)—RESTRICTED USE IN OREGON.

Chromobacterium subsutagae (Grandevo) at 0.3 to 0.9 lb ai/a per 100 gal. PHI 0 days. REI 4 hr. OMRI-listed for organic use.

cyfluthrin (Tombstone) at 0.025 to 0.044 lb ai/a. PHI 7 days for grazing or cutting. Only effective on small larvae. REI 12 hr. Retreatment interval 5 days. Do not exceed 0.088 lb ai/a per cutting or 0.35 lb ai/a total per season. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Group 3A)
gamma-cyhalothrin (Declare) at 0.01 to 0.015 lb ai/a PHI 1 day for forage harvest or 7 days for hay harvest. REI 24 hr. Do not exceed 0.015 lb ai/a per cutting or 0.06 lb ai/a per season. Refer to product labels for application limits if products containing gamma-cyhalothrin and products containing lambda-cyhalothrin are to be used in the same season. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Group 3A)

GS-omega/kappa-Hxtx-Hv1a (Spear Biological) at 0.08 lb ai/a. PHI 0 days. REI 4 hr. Do not exceed 2 lb ai/a per year.

indoxacarb (Steward) at 0.065 to 0.11 lb ai/a for beet armyworm and 0.09 to 0.11 lb ai/a for western yellowstriped armyworm. PHI 7 days for grazing or cutting. REI 12 hr. Do not exceed one application per cutting or 0.44 lb ai/a per season. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it
to drift to blooming crops if bees are visiting the treatment area. (Group 22A)

- lambda-cyhalothrin (Warrior II) at 0.02 to 0.03 lb ai/a. PHI 1 day for forage harvest or 7 days for hay harvest. REI 24 hr. Apply only to pure stands. Do not apply when bees are actively foraging. Do not exceed 0.03 lb ai/a per cutting or 0.12 lb ai/a per season. Refer to product labels for application limits if products containing gamma-cyhalothrin and products containing lambda-cyhalothrin are to be used in the same season. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Group 3A)

- malathion (numerous products) at 1 to 1.25 lb ai/a. PHI 0 days. REI 12 hr. Not effective below 65°F. Not effective after worms reach lengths over 0.375 inch. Retreatment interval 14 days. Limit to 2 applications per cutting. Malathion is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply malathion or allow it to drift to blooming crops if bees are visiting the treatment area. (Group 3A)

- methomyl (Lannate LV; other products) at 0.45 to 0.9 lb ai/a. PHI 7 days for grazing or cutting. REI 48 hr. Do not exceed 10 applications or 3.6 lb ai/a per season. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Group 1B)

- methoxyfenozide (Intrepid 2F) at 0.06 to 0.12 lb ai/a. PHI 0 days. PHI 7 days grazing/forage, 7 days hay. REI 4 hr. Do not apply more than once per cutting. Do not apply more than 0.5 lb ai/a per year. (Group 1B)

- permethrin (numerous products) at 0.05 to 0.2 lb ai/a. PHI 0 days at 0.1 lb ai/a or less, 14 days at more than 0.1 lb ai/a. PHI 24 hr. PHI 12 hr. Do not exceed 0.2 lb ai/a per cutting. Retreatment interval 30 days. Permethrin is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply permethrin or allow it to drift to blooming crops if bees are visiting the treatment area. (Group 3A)

- spinosad (Entrust SC) at 0.031 to 0.063 lb ai/a. PHI 0 days forage; 3 days hay or fodder. REI 4 hr. Do not exceed 0.186 lb ai/a per season. Do not exceed 6 applications per season. Entrust is OMRI-listed for organic use. This product is toxic to bees exposed to treatment for 3 hours following treatment. Do not apply this pesticide to blooming, pollen-shedding or nectar-producing parts of plants if bees may forage on the plants during this time period. (Group 5)

- zeta-cypermethrin Mustang at 0.035 to 0.05 lb ai/a, or Mustang Maxx at 0.0175 to 0.025 lb ai/a. PHI 3 days for cutting or grazing, 7 days for harvesting seed. REI 12 hr. Retreatment interval 7 days. Do not use more than 0.1 lb ai/a per cutting or more than 0.3 lb ai/a per season (Mustang) or 0.05 lb ai/a per cutting or 0.15 lb ai/a per season (Mustang Maxx). These products are highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Group 3A)

Alfalfa hay—Blister beetle

*Epicauta* spp.

*Meloe* spp.

**Pest description and crop damage** Large, gray to black elongate beetles feed on foliage in late spring and summer. Feeding on hay causes little, if any, crop injury. However, blister beetles are a serious concern for hay producers and livestock owners because the cantharidin in the blister beetle causes cantharidiasis or blister-beetle poisoning when livestock eat hay that contains it. Cantharidin irritates animals’ gastrointestinal and urinary tracts, may irritate the mucous lining of the mouth, may affect behavior, and sometimes kills horses, cattle, and sheep. Symptoms include blisters on the tongue and mouth, colic, diarrhea, blood or intestinal lining discharge in stools, and problems with urination or bloody discharge in urine. If you suspect blister-beetle poisoning, contact a veterinarian immediately. For additional information, see: Blister beetles; Pests or Beneficial Predators? [http://cru.cahe.wsu.edu/CEPublications/FS113E/FS113E.pdf](http://cru.cahe.wsu.edu/CEPublications/FS113E/FS113E.pdf).

**Management—chemical control**

- carbaryl (numerous products) at 0.5 to 1 lb ai/a. PHI 7 days for grazing or cutting. REI 12 hr. Do not apply more than once per cutting. Carbaryl may burn or yellow hay under some conditions (wet foliage, high humidity). Carbaryl is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply carbaryl or allow it to drift to blooming crops if bees are visiting the treatment area. (Group 1A)

- chlorantraniliprole/lamba-cyhalothrin (Besiege) at 0.049 to 0.078 lb ai/a. PHI 1 day for forage and 7 days for hay. REI 24 hr. Minimum of 5 days between applications. Do not exceed 0.12 lb ai of products containing lambda-cyhalothrin or 0.2 lb ai of chlorantraniliprole-containing foliar products per acre per growing season. Refer to product labels for application limits if products containing gamma-cyhalothrin and products containing lambda-cyhalothrin are to be used in the same season. Because of the pyrethroid component (lambda-cyhalothrin), this product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Groups 28 and 3A)

- chlorpyrifos/gamma cyhalothrin (Cobalt) at 0.38 to 0.76 lb ai/a. PHI 14 days at low rate to 21 days above 0.52 lb ai/a. REI 1 day. Do not apply Cobalt or any other product containing chlorpyrifos more than once per cutting, or more than 4 times per season. Refer to product labels for application limits if products containing gamma-cyhalothrin and products containing lambda-cyhalothrin are to be used in the same season. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Groups 1B and 3A)

**RESTRICTED USE IN OREGON.**

- gamma-cyhalothrin (Declare) at 0.01 to 0.015 lb ai/a. PHI 1 day for forage harvest or 7 days for hay harvest. REI 24 hr. Do not exceed 0.015 lb ai/a per cutting or 0.06 lb ai/a per season. Refer to product labels for application limits if products containing gamma-cyhalothrin and products containing lambda-cyhalothrin are to be used in the same season. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Group 3A)

- lambda-cyhalothrin (Warrior II) at 0.02 to 0.03 lb ai/a. PHI 1 day for forage harvest or 7 days for hay harvest. REI 24 hr. Apply only to pure stands. Do not apply when bees are actively foraging. Do not exceed 0.03 lb ai/a per cutting or 0.12 lb ai/a per season. Refer to product labels for application limits if products containing gamma-cyhalothrin and products containing lambda-cyhalothrin are to be used in the same season. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Group 3A)
Alfalfa hay—Clover leaf weevil
_Hypera punctata_

Pest description and crop damage  This is the largest weevil found in legume fields. Fully developed larvae are about 0.5 inch long, green to yellow, and have a brown head and a white or pink line down the center of the back. Larvae feed on buds and leaves. Larvae rarely need chemical control in alfalfa.

Management—chemical control
- chlorantraniliprole/lamda-cyhalothrin (Besiege) at 0.059 to 0.088 lb ai/a. PHI 1 day for forage and 7 days for hay. REI 24 hr. Minimum of 5 days between applications. Do not exceed 0.12 lb ai of products containing lambda-cyhalothrin or 0.2 lb ai of chlorantraniliprole-containing foliar products per acre per growing season. Refer to product labels for application limits if products containing gamma-cyhalothrin and products containing lambda-cyhalothrin are to be used in the same season. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Groups 28 and 3A)
- chlorpyrifos/gamma cyhalothrin (Cobalt) at 0.38 to 0.76 lb ai/a. PHI 14 days at low rate to 21 days above 0.52 lb ai/a. REI 24 hr. Do not apply Cobalt nor any other product containing chlorpyrifos more than once per cutting or more than 4 times per season. Refer to product labels for application limits if products containing gamma-cyhalothrin and products containing lambda-cyhalothrin are to be used in the same season. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Groups 28 and 3A)

RESTRICTED USE IN OREGON.
- chlorpyrifos/zeta-cypermethrin (Stallion) at 0.12 ai/a (0.001 lb zeta-cypermethrin + 0.11 lb chlorpyrifos) to 0.275 ai/a (0.025 lb zeta-cypermethrin + 0.25 lb chlorpyrifos). PHI 7. REI 24 hr. Do not exceed 0.075 lb ai of products containing zeta-cypermethrin or 0.75 lb ai of chlorpyrifos-containing products per acre per growing season. Do not apply this product or any other product containing chlorpyrifos more than 4 times per season. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Groups 1B and 3A) —RESTRICTED USE IN OREGON.
- gamma-cyhalothrin (Declare) at 0.01 to 0.015 lb ai/a. PHI 1 day for forage harvest or 7 days for hay harvest. REI 24 hr. Do not exceed 0.015 lb ai/a per cutting or 0.06 lb ai/a per season. Refer to product labels for application limits if products containing gamma-cyhalothrin and products containing lambda-cyhalothrin are to be used in the same season. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Group 3A)
- lambda-cyhalothrin (Warrior II) at 0.02 to 0.03 lb ai/a. PHI 1 day for forage harvest or 7 days for hay harvest. REI 24 hr. Apply only to pure stands. Do not apply when bees are actively foraging. Do not exceed 0.03 lb ai/a per cutting or 0.12 lb ai/a per season. Refer to product labels for application limits if products containing gamma-cyhalothrin and products containing lambda-cyhalothrin are to be used in the same season. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Group 3A)
- malathion (numerous products) at 1 to 1.25 lb ai/a. PHI 0 days. REI 12 hr. Not effective below 65°F. Retreatment interval 14 days. Do not make more than 2 applications per cutting. Malathion is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Group 1B)

Alfalfa hay—Clover root curculio
_Sitona hispidulus_

Pest description and crop damage  Adults are grayish weevils about 0.16 inch long. Larvae feed on fibrous roots and chew cavities in main roots but usually do not significantly reduce yield.

Management—chemical control (Adult weevils only)
- chlorantraniliprole/lamda-cyhalothrin (Besiege) at 0.059 to 0.088 lb ai/a. PHI 1 day for forage and 7 days for hay. REI 24 hr. Minimum of 5 days between applications. Do not exceed 0.12 lb ai of products containing lambda-cyhalothrin or 0.2 lb ai of chlorantraniliprole-containing foliar products per acre per growing season. Refer to product labels for application limits if products containing gamma-cyhalothrin and products containing lambda-cyhalothrin are to be used in the same season. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Groups 28 and 3A)
- chlorpyrifos/gamma cyhalothrin (Cobalt) at 0.38 to 0.76 lb ai/a. PHI 14 days at low rate to 21 days above 0.52 lb ai/a. REI 24 hr. Do not apply Cobalt nor any other product containing chlorpyrifos more than once per cutting or more than 4 times per season. Refer to product labels for application limits if products containing gamma-cyhalothrin and products containing lambda-cyhalothrin are to be used in the same season. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Groups 28 and 3A)
- chlorpyrifos/zeta-cypermethrin (Stallion) at 0.12 ai/a (0.001 lb zeta-cypermethrin + 0.11 lb chlorpyrifos) to 0.275 ai/a (0.025 lb zeta-cypermethrin + 0.25 lb chlorpyrifos). PHI 7. REI 24 hr. Do not exceed 0.075 lb ai of products containing zeta-cypermethrin or 0.75 lb ai of chlorpyrifos-containing products per acre per growing season. Do not apply this product or any other product containing chlorpyrifos more than 4 times per season. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Groups 1B and 3A) —RESTRICTED USE IN OREGON.
- gamma-cyhalothrin (Declare) at 0.01 to 0.015 lb ai/a. PHI 1 day for forage harvest or 7 days for hay harvest. REI 24 hr. Do not exceed 0.015 lb ai/a per cutting or 0.06 lb ai/a per season. Refer to product labels for application limits if products containing gamma-cyhalothrin and products containing lambda-cyhalothrin are to be used in the same season. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Groups 1B and 3A) —RESTRICTED USE IN OREGON.
- lambda-cyhalothrin (Warrior II) at 0.02 to 0.03 lb ai/a. PHI 1 day for forage harvest or 7 days for hay harvest. REI 24 hr. For adult suppression only. Refer to product labels for application limits if products containing gamma-cyhalothrin and products containing lambda-cyhalothrin are to be used in the same season. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Group 3A)
containing lambda-cyhalothrin are to be used in the same season. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Group 3A)

### Alfalfa hay—Cutworm

**Includes**

- Army cutworm (*Euxoa auxiliaris*)—adults are called “miller moths”
- Clover cutworm (*Scotogramma trifolii*)
- Dingy cutworm (*Feltia jaculifera*)
- Granulate cutworm (*Feltia subterranea*)
- Redbacked cutworm (*Euxoa ochrogaster*)
- Variegated cutworm (*Peridroma saucia*)

**Pest description and crop damage**

Cutworms usually are dull gray, brown, or black and may be striped or spotted. They often curl up when disturbed. They usually feed at night and by day are found under leaves or in the soil at moisture level. Cutworms can kill seedlings and reduce stands. If alfalfa fields do not “green up” in the spring, or are slow to regrow after cutting in the fall, look for cutworms. Small populations (less than one larva/sq yd) can damage new seedlings. Cutworms are primarily a pest of alfalfa and clovers, but they attack other legumes also. Army cutworms, redbacked and variegated cutworms begin feeding in the fall and overwinter as half-grown larvae in grain and hay fields. Most damage occurs as caterpillars complete their development in spring. Overwinter as partially grown caterpillars. In mild winter years, be aware of large populations that can cause significant damage in late winter and early spring. In mild winter years, be aware of large populations that can cause significant damage in late winter and early spring. Variegated cutworm has an overwinter generation similar to the army cutworm and a midsummer generation. Redbacked cutworms overwinter as eggs and caterpillars commence feeding in late winter to early spring.

**Management—chemical control**

When convenient, irrigate the field before treating for redbacked or army cutworms. This brings larvae to the surface, making control easier. Applications in late evening, when larvae usually feed above ground, are most effective.

- **alpha-cypermethrin** (*Fastac*) at 0.014 to 0.025 lb ai/a. PHI 3 days of cutting or grazing. REI 12 hr. Retreatment interval 7 days. Do not exceed 0.075 lb ai/a per season. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Group 3A)
- **azadirachtin** (*Aza-Direct, Neemix 4.5*)—See specific labels for rates. PHI 0 days. REI 4 hr. Azadiracetin and Neemix 4.5 are OMRI-listed for organic use.
- **Bacillus thuringiensis** (numerous products) at 0.25 to 1.5 lb product/a. PHI 0 days. REI 4 hr. Most effective on small caterpillars, but use highest recommended rate for fully developed ones. A spreader-sticker may improve performance. Some formulations are OMRI-listed for organic use. (Group 11)
- **beta-cyfluthrin** (*Baythroid XL*) at 0.0065 to 0.0125 lb ai/a. PHI 7 days for grazing or cutting. REI 12 hr. Do not exceed 0.044 lb ai/a per cutting or 0.175 lb ai/a total per season. Retreatment interval 5 days. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Group 3A)
- **carbaryl** (numerous products) at 1 to 1.5 lb ai/a. PHI 7 days for grazing or cutting. REI 12 hr. Do not apply more than once per cutting. Carbaryl may burn or yellow hay under some conditions (wet foliage, high humidity). Latex-based formulations, such as Sevin XLR Plus, are less hazardous to bees. (Group 1A)
- **chlorantraniliprole/lambda-cyhalothrin** (*Besiage*) at 0.049 to 0.078 lb ai/a. PHI 1 day for forage and 7 days for hay. REI 24 hr. Minimum of 5 days between applications. Do not exceed 0.12 lb ai of lambda-cyhalothrin or 0.2 lb ai of chlorantraniliprole-containing foliar products per acre per growing season. Refer to product labels for application limits if products containing gamma-cyhalothrin and products containing lambda-cyhalothrin are to be used in the same season. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Group 28 and 3A)
- **chlorpyrifos** (numerous products) at 0.5 to 1.5 lb ai/a. PHI for grazing or cutting is 7 days at 0.25 lb ai/a or 14 days at 0.5 lb ai/a or 21 days for rates above 0.5 lb ai/a. REI 24 hr. Do not apply any chlorpyrifos products more than four times per season or more than once per cutting. Do not reapply within 10 days of the first application. Certain products can be chemigated by sprinkler irrigation. Minor phytotoxicity is possible on new growth.
- **chlorpyrifos/gamma-cyhalothrin** (Cobalt) at 0.26 to 0.52 lb ai/a. PHI 14 to 21 days. REI 24 hr. Do not apply Cobalt nor any other product containing chlorpyrifos more than once per cutting nor more than 4 times per season. Refer to product labels for application limits if products containing gamma-cyhalothrin and products containing lambda-cyhalothrin are to be used in the same season. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Group 1B)—**RESTRICTED USE IN OREGON.**
- **chlorpyrifos/gamma-cyhalothrin** (Cobalt) at 0.26 to 0.52 lb ai/a. PHI 14 to 21 days. REI 24 hr. Do not apply Cobalt nor any other product containing chlorpyrifos more than once per cutting nor more than 4 times per season. Refer to product labels for application limits if products containing gamma-cyhalothrin and products containing lambda-cyhalothrin are to be used in the same season. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Group 1B and 3A)—**RESTRICTED USE IN OREGON.**
- **Chromobacterium subtsugae** (*Grandevo*) at 0.3 to 0.9 lb ai/a per 100 gal. PHI 0 days. REI 4 hr.
- **cyfluthrin** (*Tombstone*) at 0.013 to 0.025 lb ai/a. PHI 7 days for grazing or cutting. REI 12 hr. Retreatment interval 5 days. Do not exceed 0.088 lb ai/a per cutting or 0.35 lb ai/a total per season. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Group 3A)
- **cyhalothrin** (*Declare*) at 0.0075 to 0.0125 lb ai/a. PHI 1 day for forage harvest or 7 days for hay harvest. REI 24 hr. Do not exceed 0.015 lb ai/a per cutting or 0.06 lb ai/a per season. Refer to product labels for application limits if products containing gamma-cyhalothrin and products containing lambda-cyhalothrin are to be used in the same season. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Group 3A)
- **indoxacarb** (*Steward*) at 0.065 to 0.11 lb ai/a. PHI 7 days for grazing or cutting. REI 12 hr. Do not exceed one application per cutting or 0.44 lb ai/a per season. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Group 3A)
- **lambda-cyhalothrin** (*Warrior II*) at 0.015 to 0.025 lb ai/a. PHI 1 day for forage harvest or 7 days for hay harvest. REI 24 hr. Apply only to pure stands. Do not apply when bees are actively foraging. Do not exceed 0.03 lb ai/a per cutting or 0.12 lb ai/a per season. Refer to product labels for application limits if products containing gamma-cyhalothrin and products containing lambda-cyhalothrin are to be used in the same season. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Group 22A)

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are to be used in the same season. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops or weeds. Do not apply any product or allow it to drift to blooming crops if bees are visiting the treatment area. (Group 3A)

♦ methomyl (Lannate LV; other products) at 0.23 to 0.9 lb ai/a. PHI 7 days for grazing or cutting. REI 48 hr. Do not exceed 10 applications or more than 3.6 lb ai/a per season. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Group 1A)

♦ permethrin (numerous products) at 0.05 to 0.2 lb ai/a. PHI 0 days forage; 3 days hay or fodder. REI 4 hr. Only for suppression of alfalfa weevil larvae. Do not exceed 0.186 lb ai/a per season. Do not exceed 6 applications per season. This product is toxic to bees exposed to treatment for 3 hours following treatment. Do not apply this pesticide to blooming, pollen-shedding or nectar-producing parts of plants if bees may forage on the plants during this time period. Some formulations are OMRI-listed for organic use. (Group 5)

♦ zeta-cypermethrin at 0.028 to 0.05 lb ai/a (Mustang), or at 0.014 to 0.025 lb ai/a (Mustang Maxx). PHI 3 days for cutting or grazing. 7 days for harvesting seed. REI 12 hr. Retreatment interval 7 days. Do not use more than 0.1 lb ai/a per cutting or more than 0.3 lb ai/a per season (Mustang) or 0.05 lb ai/a per cutting or 0.15 lb ai/a per season (Mustang Maxx). These products are highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Group 3A)

♦ chlorpyrifos/gamma cyhalothrin (Cobalt) at 0.14 to 0.26 lb ai/a. PHI 14 days. REI 24 hr. Do not apply Cobalt nor any other product containing chlorpyrifos more than once per cutting or more than 4 times per season. Refer to product labels for application limits if products containing gamma-cyhalothrin and products containing lambda-cyhalothrin are to be used in the same season. (Groups 1B and 3A) — RESTRICTED USE IN OREGON.

♦ chlorpyrifos/zeta-cypermethrin (Stallion) at 0.12 ai/a (0.001 lb zeta-cypermethrin + 0.11 lb chlorpyrifos) to 0.275 ai/a (0.025 lb zeta-cypermethrin + 0.25 lb chlorpyrifos). PHI 7. REI 24 hr. Do not exceed 0.075 lb ai of products containing zeta-cypermethrin or 0.75 lb ai of chlorpyrifos-containing products per acre per growing season. Do not apply this product or any other product containing chlorpyrifos more than 4 times per season. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Groups 1B and 3A) — RESTRICTED USE IN OREGON.

♦ dimethoate (numerous products) at 0.25 to 0.5 lb ai/a. PHI 10 days for grazing or cutting. REI 48 hr. Suppression only. Do not apply during bloom. Apply only once per cutting. Effective only on the cutting to which it is applied. PHI 10 days for harvest or grazing. Do not exceed 0.5 lb ai/a per season. (Group 1B)

♦ gamma-cyhalothrin (Declare) at 0.01 to 0.015 lb ai/a. PHI 1 day for forage harvest or 7 days for hay harvest. REI 24 hr. Do not exceed 0.015 lb ai/a per cutting or 0.06 lb ai/a per season. Refer to product labels for application limits if products containing gamma-cyhalothrin and products containing lambda-cyhalothrin are to be used in the same season. (Group 3A)

♦ indoxacarb (Steward) at 0.039 to 0.059 lb ai/a. PHI 7 days for grazing or cutting. REI 12 hr. Do not exceed one application per cutting or 0.44 lb ai/a per season. (Group 22A)

♦ lambda-cyhalothrin (Warrior II) at 0.02 to 0.03 lb ai/a. PHI 1 day for forage harvest or 7 days for hay harvest. REI 24 hr. Apply only to pure stands. Do not apply when bees are actively foraging. Do not exceed 0.03 lb ai/a per cutting or 0.12 lb ai/a per season.

Alfalfa hay—Grasshopper

Includes several species, especially Melanoplus spp.

Pest description and crop damage Both nymphs and adult grasshoppers feed on foliage. Early management of grasshopper populations is critical. Consider treatment when populations exceed 8 adults or large nymphs or 12 small nymphs per yard. For additional information, see: https://www.agronomy.org/files/publications/alfalfa-management-guide.pdf.

Management—chemical control

Most of the following insecticides are hazardous to bees and should not be used if bees are foraging in the alfalfa.

♦ alpha-cypermethrin (Fastac EC) at 0.0175 to 0.025 lb ai/a. PHI 3 days of cutting or grazing. REI 12 hr. Retreatment interval 7 days. Do not exceed 0.075 lb ai/a per season.

♦ beta-cyfluthrin (Baythroid XL) at 0.0155 to 0.022 lb ai/a. PHI 7 days for grazing or cutting. REI 12 hr. Retreatment interval 5 days. Do not exceed 0.044 lb ai/a per cutting or 0.175 lb ai/a total per season. (Group 3A)

♦ chlorantraniliprole (Coragen, Prevathon) at 0.026 to 0.065 lb ai/a. PHI 0 days. REI 4 hr. Do not exceed 0.2 lb ai/a or 4 applications per year or 1 application per cutting. Retreatment interval 3 days. (Group 28). Apply when the majority of population is in the nymphal stage. Performance is improved with the addition of a Methylated Seed Oil (MSO) adjuvant at 1 gallon per 100 gallons of spray volume (1% v/v).
Alfalfa hay—Meadow spittlebug

*Philaenus spumarius*

**Pest description and crop damage** Nymphs are recognized by the frothy spittle mass that they excrete over their bodies. Meadow spittlebug can stunt plant growth and kill young plants. Chemical control usually is not warranted. For additional information, see: [http://extension.cropsci.illinois.edu/fieldcrops/alfalfa/meadow_spittlebug/](http://extension.cropsci.illinois.edu/fieldcrops/alfalfa/meadow_spittlebug/)

**Management—chemical control**

These insects are very difficult to control because most insecticides cannot penetrate their spittle mass. The following insecticides are hazardous to bees and should not be used if bees are foraging in the alfalfa.

- **alpha-cypermethrin** (Fastac EC) at 0.014 to 0.025 lb ai/a. PHI 3 days of cutting or grazing. REI 12 hr. Retreatment interval 7 days. Do not exceed 0.075 lb ai/a per season.
- **beta-cyfluthrin** (Baythroid XL) at 0.0065 to 0.0125 lb ai/a. PHI 7 days for grazing or cutting. REI 12 hr. Retreatment interval 5 days. Do not exceed 0.044 lb ai/a per cutting or 0.175 lb ai/a total per season. (Group 3A)
- **chlorantraniliprole/lambda-cyhalothrin** (Besiежe) at 0.059 to 0.088 lb ai/a. PHI 1 day for forage and 7 days for hay. REI 24 hr. Minimum of 5 days between applications. Do not exceed 0.12 lb ai of products containing lambda-cyhalothrin or 0.2 lb ai of chlorantraniliprole-containing foliar products per acre per growing season. Refer to product labels for application limits if products containing gamma-cyhalothrin and products containing lambda-cyhalothrin are to be used in the same season. (Group 3A)
- **chlorpyrifos** (numerous products) at 0.5 to 1 lb ai/a. PHI for forage or 7 days for hay. PHI 0 days or 21 days for rates above 0.5 lb ai/a. REI 24 hr. Do not apply any chlorpyrifos products more than four times per season or more than once per cutting. Do not reapply within 10 days of the first application. Certain products can be chemigated by sprinkler irrigation. Minor phytotoxicity is possible on new growth. (Group 1B)
- **chlorpyrifos/gamma cyhalothrin** (Cobalt) at 0.38 to 0.76 lb ai/a. PHI 14 to 21 days. REI 1 day. Do not apply Cobalt nor any other product containing chlorpyrifos more than once per cutting nor more than 4 times per season. Refer to product labels for application limits if products containing gamma-cyhalothrin and products containing lambda-cyhalothrin are to be used in the same season. (Group 1B and 3A)
- **cyfluthrin** (Tomstone) at 0.013 to 0.025 lb ai/a. PHI 7 days for grazing or cutting. REI 12 hr. Do not apply more than 0.088 lb ai/a per cutting or 0.35 lb ai/a total per season. (Group 3A)
- **cypermethrin Mustang** at 0.028 to 0.05 lb ai/a, or Mustang Maxx at 0.0175 to 0.025 lb ai/a. PHI 7 days for cutting or grazing. PHI 12 hr. Do not apply more than once per cutting. Do not apply during bloom. Do not use latex- or pineolene-based adjuvants. (Group 1B)
- **clorpyrifos/zeta-cypermethrin** (Stallion) at 0.12 ai/a (0.001 lb zeta-cypermethrin + 0.11 lb chlorpyrifos) to 0.275 ai/a (0.025 lb zeta-cypermethrin + 0.25 lb chlorpyrifos). PHI 7. REI 24 hr. Do not exceed 0.075 lb ai of products containing zeta-cypermethrin or 0.75 lb ai of chlorpyrifos-containing products per acre per growing season. Do not apply this product or any other product containing chlorpyrifos more than 4 times per season. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area. (Groups 1B and 3A)

Alfalfa hay—Pea leaf weevil

*Sitona lineata*

**Pest description and crop damage** Adults are grayish brown weevils about 0.16 inch long with three faint stripes on the thorax. They appear in large numbers in spring and sometimes late summer. Adult feeding occasionally can cause substantial defoliation, which is of most concern on seedling stands. Pea leaf weevil adults migrate in large numbers when other crops they are infesting are harvested. Their presence in fields is usually spotty, and targeted treatments at field margins can be very effective.

**Management—chemical control**

- **alpha-cypermethrin** (Fastac EC) at 0.014 to 0.025 lb ai/a. PHI 3 days of cutting or grazing. REI 12 hr. Retreatment interval 7 days. Do not exceed 0.2 lb ai/a per cutting. Retreatment interval 30 days. (Group 3A)
- **cypermethrin Mustang** (Group 3A) at 0.028 to 0.05 lb ai/a, or Mustang Maxx at 0.014 to 0.025 lb ai/a. PHI 3 days for cutting or grazing, 7 days for harvesting seed. REI 12 hr. Retreatment interval 7 days. Do not exceed 0.2 lb ai/a or less, 14 days at more than 0.1 lb ai/a. PHI 1 day for forage harvest or 7 days for hay harvest. REI 24 hr. Do not apply more than once per cutting. Do not apply during bloom. Do not use latex- or pineolene-based adjuvants. (Group 1B)
- **cypermethrin Mustang** (Group 3A) at 0.0175 to 0.025 lb ai/a per season (Mustang) or 0.05 lb ai/a per cutting or 0.15 lb ai/a per season (Mustang Maxx). (Group 3A)
- **cyfluthrin** (Baythroid XL) at 0.0065 to 0.0125 lb ai/a. PHI 7 days for grazing or cutting, REI 5 days. Do not apply more than once per cutting. Do not apply during bloom. Do not use latex- or pineolene-based adjuvants. (Group 1B)
- **Zeta-Cypermethrin Mustang** at 0.028 to 0.05 lb ai/a. PHI 7 days for grazing or cutting. REI 12 hr. Do not exceed 0.088 lb ai/a per cutting or 0.35 lb ai/a total per season. (Group 3A)
- **alpha-cypermethrin** (Fastac EC) at 0.014 to 0.025 lb ai/a. PHI 7 days for grazing or cutting. REI 12 hr. Do not apply more than once per cutting. Do not apply during bloom. Do not use latex- or pineolene-based adjuvants. (Group 1B)
- **alpha-cypermethrin** (Fastac EC) at 0.014 to 0.025 lb ai/a. PHI 3 days of cutting or grazing. REI 12 hr. Do not exceed 0.088 lb ai/a per cutting or 0.35 lb ai/a total per season. (Group 3A)
- **Zeta-Cypermethrin Mustang** at 0.0175 to 0.025 lb ai/a per season (Mustang) or 0.05 lb ai/a per cutting or 0.15 lb ai/a per season (Mustang Maxx). (Group 3A)
- **alpha-cypermethrin** (Fastac EC) at 0.014 to 0.025 lb ai/a. PHI 3 days of cutting or grazing. REI 12 hr. Retreatment interval 7 days. Do not exceed 0.2 lb ai/a per cutting. Retreatment interval 30 days. (Group 3A)
- **Zeta-Cypermethrin Mustang** (Group 3A) at 0.028 to 0.05 lb ai/a. PHI 3 days for cutting or grazing, 7 days for harvesting seed. REI 12 hr. Retreatment interval 7 days. Do not exceed 0.2 lb ai/a or less, 14 days at more than 0.1 lb ai/a. PHI 1 day for forage harvest or 7 days for hay harvest. REI 24 hr. Do not apply more than once per cutting. Do not apply during bloom. Do not use latex- or pineolene-based adjuvants. (Group 1B)
- **alpha-cypermethrin** (Fastac EC) at 0.014 to 0.025 lb ai/a. PHI 3 days of cutting or grazing. REI 12 hr. Retreatment interval 7 days. Do not exceed 0.088 lb ai/a per cutting or 0.35 lb ai/a total per season. (Group 3A)
- **alpha-cypermethrin** (Fastac EC) at 0.014 to 0.025 lb ai/a. PHI 3 days for cutting or grazing, 7 days for harvesting seed. REI 12 hr. Retreatment interval 7 days. Do not exceed 0.2 lb ai/a per cutting. Retreatment interval 30 days. (Group 3A)
- **Zeta-Cypermethrin Mustang** (Group 3A) at 0.028 to 0.05 lb ai/a. PHI 3 days for cutting or grazing, 7 days for harvesting seed. REI 12 hr. Retreatment interval 7 days. Do not exceed 0.2 lb ai/a or less, 14 days at more than 0.1 lb ai/a. PHI 1 day for forage harvest or 7 days for hay harvest. REI 24 hr. Do not apply more than once per cutting. Do not apply during bloom. Do not use latex- or pineolene-based adjuvants. (Group 1B)
- **alpha-cypermethrin** (Fastac EC) at 0.014 to 0.025 lb ai/a. PHI 3 days of cutting or grazing. REI 12 hr. Retreatment interval 7 days. Do not exceed 0.2 lb ai/a per cutting. Retreatment interval 30 days. (Group 3A)
Do not exceed 0.044 lb ai/a per cutting or 0.175 lb ai/a total per season. (Group 3A)

* chlorantraniliprole/lambda-cyhalothrin (Besiège) at 0.059 to 0.088 lb ai/a. PHI 1 day for forage and 7 days for hay. REI 24 hr. Minimum of 5 days between applications. Do not exceed 0.12 lb ai of products containing lambda-cyhalothrin or 0.2 lb ai of chlorantraniliprole per acre per growing season. Refer to product labels for application limits if products containing gamma-cyhalothrin and products containing lambda-cyhalothrin are to be used in the same season. (Group 28 and 3A)

* chlorpyrifos (numerous products) at 0.25 to 0.5 lb ai/a. PHI for foraging or cutting is 7 days at 0.25 lb ai/a, 14 days at 0.5 lb ai/a. REI 24 hr. Do not apply any chlorpyrifos products more than four times per season or more than once per cutting. Do not reapply within 10 days of the first application. Certain products can be chemigated by sprinkler irrigation. Minor phytotoxicity possible on new growth. (Group 1B) RESTRICTED USE IN OREGON.

Alfalfa hay—Slug

Pest description and crop damage Snails and slugs are nocturnal and generally feed during the night damaging many varieties of plants and plant seedlings. They inhabit damp, moist areas around decaying refuse, organic matter, and hide at the base of growing plants. Their presence can be detected by the shiny trails left on the soil surface. Damage is to new seedlings and primarily to hay grown west of the Cascades. For additional information, see: http://ohioline.osu.edu/ent-fact/pdf/0020.pdf

Management—chemical control

* metaldehyde baits (such as Deadline M-Ps mini pellets or Trail’s End LG large granules)—PHI 0 days. REI 12 hr. Broadcast bait should be applied to the soil over hot spots in the field. Do not apply to edible plant parts or allow contamination. Do not apply to dry soil. For best results, apply soon after rain or irrigation, and apply in the evenings when slugs are most active. Rain and irrigation water following application will deactivate baits. See specific product label for rates.

See also:

Slug Control

Alfalfa hay—Western spotted cucumber beetle

* Diabrotica undecimpunctata

Pest description and crop damage Adults are green to yellow with 12 black spots on wing covers. They feed on seedlings and retard growth or reduce stands. Occasionally require control on new stands west of the Cascades.

Management—chemical control

The following insecticides are hazardous to bees and should NOT be used if bees are foraging in the alfalfa.

* beta-cyfluthrin (Baythroid XL) at 0.0125 to 0.022 lb ai/a. PHI 7 days for grazing or cutting. REI 12 hr. Retreatment interval 5 days. Do not exceed 0.044 lb ai/a per cutting or 0.175 lb ai/a total per season. (Group 3A)

* carbachlor (numerous products) at 1 lb ai/a. PHI 7 days for grazing or cutting. REI 12 hr. Do not apply more than once per cutting. Carbachlor may burn or yellow hay under some conditions (wet foliage, high humidity). Latex-based formulations, such as Sevin XLR Plus, are less hazardous to bees. (Group 1A)

* chlorantraniliprole/lambda-cyhalothrin (Besiège) at 0.059 to 0.088 lb ai/a. PHI 1 day for forage and 7 days for hay. REI 24 hr. Minimum of 5 days between applications. Do not exceed 0.12 lb ai of lambda-cyhalothrin or 0.2 lb ai of chlorantraniliprole per acre per growing season. Refer to product labels for application limits if products containing gamma-cyhalothrin and products containing lambda-cyhalothrin are to be used in the same season. (Group 28 and 3A)

* chlorpyrifos (numerous products) at 0.25 to 0.5 lb ai/a. PHI for foraging or cutting is 7 days at 0.25 lb ai/a, 14 days at 0.5 lb ai/a. REI 24 hr. Do not apply any chlorpyrifos products more than four times per season or more than once per cutting. Do not reapply within 10 days of the first application. Certain products can be chemigated by sprinkler irrigation. Minor phytotoxicity possible on new growth. (Group 1B) RESTRICTED USE IN OREGON.

* cyfluthrin (Tomborne) at 0.025 to 0.044 lb ai/a. PHI 7 days for grazing or cutting. REI 12 hr. Retreatment interval 5 days. Do not exceed 0.088 lb ai/a per cutting or 0.35 lb ai/a total per season. (Group 3A)

* gamma-cyhalothrin (Cobalt) at 0.14 to 0.26 lb ai/a. PHI 14-21 days. REI 24 hr. Do not apply Cobalt nor any other product containing chlorpyrifos more than once per cutting nor more than 4 times per season. Refer to product labels for application limits if products containing gamma-cyhalothrin and products containing lambda-cyhalothrin are to be used in the same season. (Groups 1B and 3A) RESTRICTED USE IN OREGON.

* permethrin (numerous products) at 0.1 to 0.2 lb ai/a. PHI 0 days at 0.1 lb ai/a or less, 14 days above 0.1 lb ai/a. REI 12 hr. Do not exceed 0.2 lb ai/a per cutting. Retreatment interval 30 days. (Group 3A)

* phosmet (Imidan 70-W) at 0.7 to 1 lb ai/a. PHI 7 days for grazing or cutting. REI 5 days. Do not apply more than once per cutting. Do not apply during bloom. Do not use latex- or pineolene-based adjuvants. (Group 1B)
Clover Hay Pests

Elizabeth Verhoeven

*Latest revision—March 2021*

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In all cases, follow the instructions on the pesticide label. The *PNW Insect Management Handbook* has no legal status, whereas the pesticide label is a legal document. Read the product label before making any pesticide applications.

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**Protect pollinators:** See How to Reduce Bee Poisoning from Pesticides.

**Important notice** Several pesticides with 24c SLN (Special Local Need) registrations for use on seed crops lack legal tolerances established for pesticide residues that may be on the seed, screenings, or hay at harvest. Therefore, certain seed grower associations in Washington, Oregon, and Idaho have declared, through their respective state departments of agriculture, that the crop produced for seed in those states is a *nonfood crop*. This declaration means that none of the seed, screenings, hay, or sprouts produced from harvested seed will be available for human or animal consumption when these pesticides have been applied. The grower must notify the seed processing plant in writing of any seed treated with these pesticides. Processed seed must be labeled: “This seed was produced using one or more products for which the United States Environmental Protection Agency has not established pesticide residue tolerances. This seed, in whole, as sprouts, or in any form, may violate requirements of the Federal Food and Drug Administration, the Oregon Department of Agriculture and other regulatory agencies.”

**Note:** Products are listed in alphabetical order and *not* in order of preference or superiority of pest control.

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**Clover hay—Aphid**

*Includes*

Clover aphid (*Neorhaphis bakeri*)

Pea aphid (*Acyrthosiphon pisum*)

**Pest description and crop damage** Clover aphid can be serious on red clover in the PNW. The clover aphid is much smaller than the pea aphid, is yellow, and builds up in spring from a few overwintered aphids that are under stipules. Large numbers secrete copious honeydew. They usually infest red, alsike, and Ladino clover. Winged forms disperse in May and June.

**Management—chemical control**

- flupyridafurone (Sivanto 200SL) at 0.091 to 0.137 lb ai/a. PHI 14 days. Retreatment interval 10 days. Do not exceed 0.365 lb ai/a per season.
- malathion (Drexel Malathion 5EC) at 0.94 to 1.25 lb ai/a. PHI 0 days. Limit 2 treatments per cutting. Retreatment interval 14 days. REI 12 hr.
- pyrethrins/PBO (Pyganic Crop Protection EC 5.0) at 0.032 to 0.05 lb pyrethrins/a. PHI 12 hr. REI 12 hr. OMRI listed for organic use.
- zeta-cypermethrin (Mustang) at 0.028 to 0.05 lb ai/a. PHI 3 days cutting and grazing; 7 days for seed. REI 12 hr. Do not apply more than 0.05 lb ai per cutting or 0.15 lb ai per season. Retreatment interval 7 days.

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**Clover hay—Clover leaf weevil**

*Hypera punctata*

**Pest description and crop damage** This is the largest weevil found in legume fields. The full-grown larva is about 0.5 inch long and has a brown head. The body is green or yellowish green shading to pink at the tip of the abdomen, with a white or pinkish line down the center of the back. Larvae feed on buds and leaves.

**Management—biological control**

During cool, moist spring weather, a fungal disease usually attacks larvae, naturally controlling them.

**Management—chemical control**

- malathion (Drexel Malathion SEC) at 0.94 to 1.25 lb ai/a. PHI 0 days. Limit 2 treatments per cutting. Retreatment interval 14 days. REI 12 hr. Do not apply more than 2.5 lb ai per acre per calendar year.

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**Clover hay—Clover root borer**

*Hylastinus obscurus*

**Pest description and crop damage** Adults are bark beetles, 0.1 inch long and dark brown. They begin activity as early as March and may disperse from March through August. Larvae are creamy white and burrow within the roots of red clover, causing extensive damage and reducing stand density and life.

**Management—chemical control**

No insecticides, registered or otherwise, are effective for controlling this pest.

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**Clover hay—Clover root curculio**

*Sitona hispidulus*

**Pest description and crop damage** Adults are small grayish weevils 0.2 inch long. Larvae feed on fibrous roots and chew cavities in main roots. This insect usually is at low levels on many of the clovers but control usually is not necessary.

**Management—chemical control**

No products are registered or recommended.

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**Clover hay—Cutworm and armyworm**

Bertha armyworm (*Mamestra configurata*)

Variegated cutworm (*Peridroma saucia*)

**Pest description and crop damage** These larvae vary a lot in color. By day, the larger larvae are in soil cracks or under duff or leaves. They commonly feed at night. Small larvae are on foliage during the day and can be sampled with a sweep net. They cut off young plants and feed on the foliage of older plants.
Management—chemical control

- azadirachtin (Neemix 4.5 IGR) at 0.015 to 0.021 lb ai/a. PHI 0 days. REI 4 hr. OMRI-listed for organic use. Armyworms and loopers only.
- Bacillus thuringiensis (Javelin) at 0.25 to 1.5 lb/a. PHI 0 days. REI 4 hr. Armyworms only. Add an appropriate spreader-sticker to enhance control. Most effective on small, actively feeding larvae. OMRI-listed for organic use.
- carbaryl (Carbaryl 4L, Sevin 4F) at 1 to 1.5 lb ai/a. PHI 7 days. Do not use carbaryl when clover is blooming or when bees are foraging actively.
- chloranraniliprole (Coragen, Prevathon) at 0.045 to 0.098 lb ai/a. PHI 0 days. REI 4 hr. Do not exceed 0.2 lb ai or 4 applications per season.
- Chromobacterium subsutagae (Grandevo) at 1 to 3 lb product per 100 gal/acre. PHI 0 days. REI 4 hr. OMRI-listed for organic use.
- malathion (Drexel Malathion 5EC) at 1.25 lb ai/a. PHI 0 days. Retreatment interval 14 days. PHI 0.25 to 1 quart in 5 to 100 gal water/acre. Adjust water volume to ensure good coverage but avoid runoff. PHI 0 days. REI 4 hr. Do not exceed 0.05 lb ai per cutting or 0.125 lb ai per season. Retreatment interval 7 days.
- zeta-cypermethrin (Mustang) at 0.035 to 0.05 lb ai/a. PHI 0 days. REI 4 hr. Do not apply more than 0.05 lb ai per cutting or 0.15 lb ai per season. Retreatment interval 7 days.

Clover hay—Lesser clover leaf weevil
Hypera nigrirostris
Pest description and crop damage Green or brown weevils about 0.125 inch long. Larvae feed under the basal leaf sheath, tunnel in the stem, and feed on florets in developing flowers. This is seldom a pest. When it is in an area, it seems to prefer red and alsike clover.

Management—chemical control

- malathion (Drexel Malathion 5EC) at 0.94 to 1.25 lb ai/a. PHI 0 days. Limit 2 treatments per cutting. Retreatment interval 14 days. REI 12 hr. Do not apply more than 2.5 lb ai per acre per calendar year.

Clover hay—Looper

Incluedes alfalfa looper (Autographa californica)

Pest description and crop damage The adult moth is grayish to light brown. Front wings have a characteristic teardrop mark. Mature larvae are about 1 inch long, light green, with pale heads. They move in a looping fashion.

Management—chemical control

- Bacillus thuringiensis (Bt)—See product labels for rates. PHI 0 days. REI 4 hr. Add an appropriate spreader-sticker to enhance control. Most effective on small, actively feeding larvae. OMRI-listed for organic use.
- chloranraniliprole (Coragen) at 0.045 to 0.098 lb ai/a. PHI 0 days. REI 4 hr. Do not exceed 0.2 lb ai or 4 applications per season.
- methoxyfenozide (Intrepid 2F) at 0.06 to 0.16 lb ai/a. PHI 7 days. Limit 2 treatments per cutting. PHI 0 days. PHI 3 days cutting and grazing; 7 days for seed. REI 12 hr. Do not apply more than 0.05 lb ai per cutting or 0.15 lb ai per season. Retreatment interval 7 days.
Clover hay—Pea leaf weevil
*Sitona lineata*

**Pest description and crop damage** Adults are small, grayish brown, faintly striped weevils about 0.2 inch long. They appear in large numbers in spring and sometimes in late summer. Adult feeding may kill seedling plants and seriously defoliate older stands. These insects migrate into fields from border areas.

**Management—chemical control**
Currently no materials are registered to control this pest. However, carbaryl (Sevin 80WSP) or Mustang MAX applied to control other weevils will also control this pest.

Clover hay—Slug

**Pest description and crop damage** Primarily a western Oregon and Washington problem. Damage is most critical when establishing a seedling stand.

**Management—chemical control**
- iron phosphate (Sluggo Maxx) at 0.12 to 0.45 lb ai/a. PHI 0 days.
- iron phosphate/spinosad (Bug-N-Sluggo) at 0.1 to 0.45 lb ai/a. PHI hay or fodder 3 days; forage 0 days. REI 4 hr. Do not exceed 3 applications in 21 days. OMRI-listed for organic use.
- metaldehyde bait at 0.4 to 1.6 lb ai/a (Deadline, Durham).

*See also: Slug Control*

Clover hay—Webworm

**Includes** beet webworm (*Loxostege sticticalis*)

**Pest description and crop damage** Caterpillars vary from light to dark with three white longitudinal stripes and many black and white tubercles.

**Management—chemical control**
- carbaryl (Sevin 4F) at 1 to 1.5 lb ai/a. PHI 7 days of harvest or grazing. Use only once per cutting. REI 12 hr. Do not use carbaryl when clover is blooming or when bees are foraging actively. Carbaryl may burn foliage under wet or hot conditions.
- methoxyfenozide (Intrepid 2F) at 0.06 to 0.16 lb ai/a. PHI 7 days for hay; 0 days for forage; livestock can enter and graze on treated area immediately after application. REI 4 hr. Do not exceed 0.5 lb.
- zeta-cypermethrin (Mustang) at 0.028 to 0.05 lb ai/a. PHI 3 days cutting and grazing; 7 days for seed. REI 12 hr. Do not apply more than 0.05 lb ai per cutting or 0.15 lb ai per season. Retreatment interval 7 days.

Clover hay—Western spotted cucumber beetle

*Diabrotica undecimpunctata*

**Pest description and crop damage** Yellowish green, black-spotted beetle, common in western Oregon and Washington. Adults feed on seedlings and can kill plants and reduce stands.

**Management—chemical control**
- carbaryl (Sevin 4F) at 1 lb ai/a. One application per cutting. PHI 7 days of harvest or grazing. Limit 1 treatment per cutting. REI 12 hr.

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**Pasture and Grass Hay Pests**

Elizabeth Verhoeven

*Latest revision—March 2021*

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In all cases, follow the instructions on the pesticide label. The *PNW Insect Management Handbook* has no legal status, whereas the pesticide label is a legal document. Read the product label before making any pesticide applications.

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**Protect pollinators:** See How to Reduce Bee Poisoning from Pesticides.

**Note:** Products are listed in alphabetical order and not in order of preference or superiority of pest control.

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**Pasture and grass hay—Armyworm and cutworm**

Many species, including
- Armyworm (*Pseudaelia unipuncta*)
- Army cutworm (*Chorizagrotis auxillaris*)
- Black cutworm (*Agrotis ipsilon*)
- Glassy cutworm (*Apamea devastator*)
- [No common name] (*Protagrotis obscura*)

**Pest description and crop damage** Larvae are 1 to 2 inches long at maturity. All, except glassy cutworm and *Protagrotis obscura* usually feed above ground on foliage after dark or during conditions of low light intensity. Larvae cause most damage to new seedlings, particularly if the previous crop was heavily infested and the larvae were not controlled.

**Management—chemical control**
- azadirachtin/pyrethrins (Azera) at 0.013 lb azadirachtin/0.014 lb pyrethrins —to– 0.044 lb azadirachtin/0.048 lb pyrethrins. Do not make more than 10 applications per season. Do not apply within 3 days unless extreme pressure, minimum 24 hr re-application window. REI 12 hr.
- *Bacillus thuringiensis kurstaki* (Xentari, Dipel) at 0.5 to 2 lb product/a. PHI 0 days. REI 4 hr. Armyworms only. Most effective on small caterpillars, but use highest recommended rate for fully developed ones. Multiple applications may be necessary for effective control. A spreader sticker may improve performance. Some formulations are OMRI-listed for organic use.
- beta-cyfluthrin (Baythroid XL) at 0.013 to 0.022 lb ai/a. PHI 0 days for grazing or hay. REI 12 hr. Do not exceed 0.089 lb ai/a per season. Retreatment interval 5 days.
- bifenthrin (Brigade WSB) at 0.033 to 0.1 lb ai/a. PHI 30 days for forage and hay. REI 12 hr. Retreatment interval 14 days. Do not exceed 0.2 lb ai/a per season.
- carbaryl (Sevin 4F) at 1 to 1.5 lb ai/a. PHI 14 days. REI 12 hr. Limit 2 treatments per year. Retreatment interval 14 days. Do not exceed 3 lb ai/a per year. Armyworms only.
- carbaryl (Sevin 5 Bait) at 1.5 lb ai/a. PHI 7 days for harvest or grazing. Limit 2 treatments per year. REI 12 hr. Retreatment interval 14 days.
- chlororantraniliprole (Coragen) at 0.045 to 0.098 lb ai/a. PHI 0 days. REI 4 hr. Retreatment interval 7 days. Do not exceed 0.2 lb ai/a or 4 applications per season.
Pasture and grass hay—Black grass bug

*Labops hesperius* and other *Labops* spp.  
*Irbisia pacifica* and other *Irbisia* spp.

**Pest description and crop damage**  
Insect is grayish black with silvery scales, about 0.25 inch long, and somewhat pear-shaped. Adults have prominent compound eyes and can have shortened or absent wings. Black grass bugs will feed on a variety of range grasses (e.g., wheatgrass, brome grass, orchardgrass, bluegrass) and field crops (e.g., barley, wheat, rye, oats). Great Basin wildrye and wheatgrasses are preferred if available, especially blue bunch wheatgrass, crested wheatgrass, and intermediate wheatgrass. Feeding causes pale spots on the leaves of cereals and, when severe, a general yellowish, stippled appearance.

**Management—chemical control**

- bifenthrin (Brigade) at 0.1 ai/a. PHI 30 days for forage and grain. Do not apply more than 0.2 lb ai/a per year. REI 12 hr.
- carbaryl (Sevin 4F) at 0.5 to 1 lb ai/a. PHI 14 days. REI 12 hr. Limit two treatments per year. Treatment interval 14 days. Do not exceed 0.03 lb ai/a per cutting or 0.09 lb ai/a per season.
- chlorantraniliprole/lambda-cyhalothrin (Besiège, Voliam Xpress) at 0.49 to 0.98 lb ai/a. PHI 0 days for grazing or cut for forage; 7 days for cut grass to be dried and harvested for hay. Treatment interval 7 days. REI 12 hr. Do not exceed 0.09 lb ai/a lambda-cyhalothrin or 0.2 lb ai/a chlorantraniliprole.

**Pasture and grass hay—Cereal leaf beetle

*Oulema melanopus*

**Pest description and crop damage**  
Adults are 0.25 inch long with a brightly colored, orange-red thorax, yellow legs, and metallic-blue head and elytra (forewings). This is a quarantine pest, and although damage is seldom seen in pasture grasses, California has strict import laws governing interstate movement of pasture hay from counties in other states known to be infested with CLB. Only grass hay from cereal leaf beetle-free PNW counties or fumigated hay from infested counties is allowed into California.

**Management—chemical control**

- beta-cyfluthrin (Baythroid XL) at 0.013 to 0.015 lb ai/a. PHI 0 days for grazing or hay. REI 12 hr. Do not exceed 0.089 lb ai/a per season. Retreatment interval 5 days.
- bifenthrin (Brigade WSB) at 0.05 to 0.1 lb ai/a. PHI 30 days for forage and hay. REI 12 hr. Retreatment interval 14 days. Do not exceed 0.2 lb ai/a per season.
- carbaryl at 1 lb ai/a. PHI 14 days. REI 12 hr. Do not exceed two applications. Retreatment interval 14 days. This pest does not occur on the carbaryl labels but when this general use insecticide is applied to control other pests when CLB is present, control is good.
- chlorantraniliprole/lambda-cyhalothrin (Besiège, Voliam Xpress) at 0.59 to 0.98 lb ai/a. PHI 0 days for grazing or cut for forage; 7 days for cut grass to be dried and harvested for hay. Treatment interval 7 days. REI 12 hr. Do not exceed 0.09 lb ai/a lambda-cyhalothrin or 0.2 lb ai/a chlorantraniliprole.

**Pasture and grass hay—Clover and winter grain mite

*Clover mite* (*Bryobia praetiosa*)  
*Winter grain mite* (*Penthaleus major*)

**Pest description and crop damage**  
Clover mite is light brown; winter grain mite is blue with red legs. These cool-season mites have caused serious damage in central Oregon pastures since 1999. Populations build in October; most damage to grass pastures is from late February through May. Grass pastures do not green up in the spring. Large populations have killed orchardgrass pastures.
Management—chemical control
Effective insecticides that control clover mite have not been identified. The two synthetic pyrethroids listed below are not labeled for winter grain mite control, but research in OR has shown them to be effective on this particular pest when used at mid-range label rates for other pests. These are recommended in Washington and Oregon only.

- beta-cyfluthrin (Baythroid XL) at 0.013 to 0.015 lb ai/a. PHI 0 days for grazing or hay. REI 12 hr. Do not exceed 0.089 lb ai/a per season. Retreatment interval 5 days.
- lambda-cyhalothrin (Warrior II) at 0.015 to 0.03 lb ai/a. PHI 0 days for grazing and forage; 7 days to be dried for hay. REI 24 hr. Do not exceed 0.03 lb ai/a per cutting or 0.09 lb ai/a per season. Minimum re-treatment window is 30 days. For suppression only.

Pasture and grass hay—European crane fly
Tipula paludosa

Pest description and crop damage Larvae are gray grubs that feed underground, on roots and crowns, from October through May. Older larvae may feed above ground on stems and leaves during the night. Large numbers can thin stands in old pastures and kill seedlings in new stands.

Management—chemical control
- beta-cyfluthrin (Baythroid XL, Warrior and Mustang) has given effective control of these pests when applied to control other labeled pests that occur at the same timing as for these products. Research in Oregon has shown it to be effective on this particular pest when used at higher-range label rates for other pests. Oregon and Washington only.
- chlorantraniliprole/lambda-cyhalothrin (Besiege, Voliam Xpress) at 0.59 to 0.98 lb ai/a. PHI 0 days for grazing or cut for forage; 7 days for cut grass to be dried and harvested for hay. Retreatment interval 7 days. REI 12 hr. Do not exceed 0.09 lb ai/a lambda-cyhalothrin or 0.2 lb ai/a chlorantraniliprole.
- gamma-cyhalothrin (Declare) at 0.01 to 0.015 lb ai/a. PHI 0 days for grazing or cut for forage; 7 days for cut grass to be dried and harvested. REI 24 hr. Do not exceed 0.45 lb ai/a per season.
- lambda-cyhalothrin (Warrior II) at 0.02 to 0.03 lb ai/a. PHI 0 days for grazing and forage; 7 days to be dried for hay. REI 24 hr. Do not exceed 0.03 lb ai/a per cutting or 0.09 lb ai/a per season.
- malathion (Fyfanon ULV) at 0.48 to 0.62 lb ai/a. PHI 0 days. REI 12 hr. Adults only. Limit 1 treatment per cutting.

Pasture and grass hay—Fly
Face fly (Musca autumnalis)
Horn fly (Haematobia irritans)

Pest description and damage Flies annoy livestock and compromise weight gain.

Management—chemical control
- diflubenzuron (Dimilin 2L, 25W) at 0.03 lb ai/a. PHI 1 day for cutting. REI 12 hr. Apply when the majority are in the 2nd through 4th instar. Do not exceed 0.03 lb ai/a (0.5 oz ai/a) per cutting or 0.09 lb ai/a (1.5 oz ai/a) per year.
- gamma-cyhalothrin (Declare) at 0.01 to 0.015 lb ai/a. PHI 0 days for grazing or cut for forage; 7 days for cut grass to be dried and harvested. REI 24 hr. Do not exceed 0.45 lb ai/a per season.
- lambda-cyhalothrin (Warrior II) at 0.02 to 0.03 lb ai/a. PHI 0 days for grazing and forage; 7 days to be dried for hay. REI 24 hr. Do not exceed 0.03 lb ai/a per cutting or 0.09 lb ai/a per season.
- malathion (Fyfanon ULV) at 0.48 to 0.62 lb ai/a. PHI 0 days. REI 12 hr. Limit 1 treatment per cutting.
- permethrin (Pursuit 4-4 ULV) —Consult label for ground or aerial ULV application.

See also:
Fly Control
Beef Cattle Pests

Pasture and grass hay—Grasshopper

Many species, including
Clearwinged grasshopper (Camnula pellucida)
Lesser migratory grasshopper (Melanoplus sanguinipes)
Redlegged grasshopper (Melanoplus femurrubrum)
Twostriped grasshopper (Melanoplus biivittatius)

Pest description and crop damage Both nymphs and adults can damage plants by feeding on the foliage, stems and heads. May attack any cereal crop.

Management—chemical and biological control
- beta-cyfluthrin (Baythroid XL) at 0.02 to 0.022 lb ai/a. PHI 0 days for grazing or hay. REI 12 hr. Do not exceed 0.089 lb ai/a per season. Retreatment interval 5 days.
- bifenthrin (Brigade WSB) at 0.05 to 0.1 lb ai/a. PHI 30 days for forage and hay. REI 12 hr. Retreatment interval 14 days. Do not exceed 0.2 lb ai/a per season.
- carbaryl (Sevin 4F) at 0.5 lb ai/a. PHI 14 days. REI 12 hr. Limit 2 treatments per year. Retreatment interval 14 days. Do not exceed 3 lb ai/a per year.
- carbaryl (Sevin 5 Bait) at 1.5 lb ai/a. PHI 7 days for harvest or grazing. REI 12 hr. Retreatment interval 14 days.
- chlorantraniliprole/lambda-cyhalothrin (Besiege, Voliam Xpress) at 0.59 to 0.98 lb ai/a. PHI 0 days for grazing or cut for forage; 7 days for cut grass to be dried and harvested for hay. Retreatment interval 7 days. REI 12 hr. Do not exceed 0.09 lb ai/a lambda-cyhalothrin or 0.2 lb ai/a chlorantraniliprole.
- cyfluthrin (Tombstone) at 0.04 to 0.044 lb ai/a. PHI 0 day. REI 12 hr. Retreatment interval 5 days. Do not exceed 0.176 lb ai/a per season.
- diflubenzuron (Dimilin 2L, 25W) at 0.015 to 0.03 lb ai/a. PHI 1 day for cutting. REI 12 hr. Apply when the majority are in the 2nd through 4th instar. Do not exceed 0.03 lb ai/a (0.5 oz ai/a) per cutting or 0.09 lb ai/a (1.5 oz ai/a) per year.
- gamma-cyhalothrin (Declare) at 0.01 to 0.015 lb ai/a. PHI 0 days for grazing or cut for forage; 7 days for cut grass to be dried and harvested. REI 24 hr. Do not exceed 0.45 lb ai/a per season.
- lambda-cyhalothrin (Warrior II) at 0.02 to 0.03 lb ai/a. PHI 0 days for grazing and forage; 7 days to be dried for hay. REI 24 hr. Do not exceed 0.03 lb ai/a per cutting or 0.09 lb ai/a per season.
- malathion (Drexel Malathion 5EC) at 1.25 lb ai/a. PHI 0 days. REI 12 hr. Do not exceed 0.2 lb ai/a per season.
- malathion (Fyfanon ULV) at 0.48 to 0.62 lb ai/a. PHI 0 days. REI 12 hr. Do not exceed 0.03 lb ai/a per season.
- malathion (Drexel Malathion 5EC) at 1.25 lb ai/a. PHI 0 days. REI 12 hr. Do not exceed 0.2 lb ai/a per season.
- malathion (Fyfanon ULV) at 0.62 to 0.92 lb ai/a. PHI 0 days. REI 12 hr. Apply by air when hatch is complete. Do not apply if rain is imminent. Most effective when air is above 70°F. Limit 1 treatment per cutting.
- zeta-cypermethrin (Mustang) at 0.028 to 0.05 lb ai/a. PHI 0 days. PHI 0 days for graze and hay; 7 days straw. REI 12 hr. Retreatment interval 7 days. Do not exceed 0.2 lb ai/a per season.
Pasture and grass hay—Grass scale
Eriococcus insignis

Pest description and crop damage
On timothy hay or timothy–alfalfa mixed-stand hay crops only. This scale weakens stands. It can be a serious pest in western regions where it has become established. A serious pest in all of western Washington.

Management—chemical control
- bifenthrin (Brigade WSB) at 0.05 to 0.1 lb ai/a. PHI 30 days for forage and hay. REI 12 hr. Retreatment interval 14 days. Do not exceed 0.2 lb ai/a per season.
- chlorantraniliprole/lambda-cyhalothrin (Besiege, Voliam Xpress) at 0.59 to 0.98 lb ai/a. PHI 0 days for grazing or cut for forage; 7 days for cut grass to be dried and harvested for hay. Retreatment interval 7 days. REI 12 hr. Do not exceed 0.09 lb ai/a lambda-cyhalothrin or 0.2 lb ai/a chlorantraniliprole.
- gamma-cyhalothrin (Declare) at 0.01 to 0.015 lb ai/a. PHI 0 days for grazing or cut for forage; 7 days for cut grass to be dried and harvested. REI 24 hr. Do not exceed 0.045 lb ai/a per season.
- lambda-cyhalothrin (Warrior II) at 0.02 to 0.03 lb ai/a. PHI 0 days for grazing or forage; 7 days to be dried for hay. REI 24 hr. Do not exceed 0.03 lb ai/a per cutting or 0.09 lb ai/a per season.
- zeta-cypermethrin (Mustang) at 0.028 to 0.05 lb ai/a. PHI 0 days and hay; 7 days straw. REI 12 hr. Retreatment interval 7 days. Do not exceed 0.2 lb ai/a per season.

Pasture and grass hay—Harvester ant
Pogonomyrmex spp.

Pest description and crop damage
Large reddish ants found east of the Cascades. They build soil and pebble mounds and destroy vegetation around the mounds. May sting viciously when disturbed.

Management—chemical control
No effective insecticides currently are registered for ant control in pastures in the Pacific Northwest.

Pasture and grass hay—Mosquito

Management—chemical control
- Bacillus thuringiensis var. israelensis (VectorBac WDG)—PHI 0 days. See label for rates. Bt products are used to control mosquito larvae in ponds, pools, catch basins, etc., and do not kill adults. Some formulations are OMRI-listed for organic use.
- Bacillus sphaericus (VectorLex WDG) at 0.5 to 1.5 lb product/a. Reapply as needed after 1 to 4 weeks. OMRI-listed for organic use.
- carbaryl (Drexel Carbaryl 4L) at 0.25 to 1 lb ai/a. For adult control. PHI 0 days. REI 12 hr.
- deltamethrin (DeltaGard) at 0.00134 lb ai/a. Do not exceed 0.0134 lb ai/a per year.
- etofenprox (Zenvex E20) at 0.00175 to 0.007 lb ai/a. Do not exceed 0.18 lb ai/a per year.
- malathion ULV (Fyfanon ULV Mosquito) at 0.2 to 0.23 lb ai/a. For adult control. PHI 0 days. REI 12 hr. Limit 1 treatment per cutting.
- naled (Dibrom 8E) at 0.1 lb ai/a. REI 48 hr. Retreatment interval 10 days where lactating dairy animals are being held. Adult mosquitoes.
- permethrin (Pursuit 4-4 ULV)—Consult label for ground or aerial ULV application.
- prallethrin/phenothrin (Duet Dual-Action Adulticide)—Consult label for ground or aerial ULV application.
- s-methoprene (Altosid SBG II)—Consult label for species controlled. Apply at 2nd to 4th larval instars. Irrigated pastures may be treated after each flooding without the removal of grazing livestock.

Pasture and grass hay—Spider mite
Tetranychus spp.

Pest description and crop damage
On timothy hay or timothy–alfalfa mixed-stand hay crops only. Spider mites silver and stunt hay crop. Can reduce yield of timothy hay crop.

Management—chemical control
- chlorantraniliprole/lambda-cyhalothrin (Besiege, Voliam Xpress) at 0.59 to 0.98 lb ai/a. PHI 0 days for grazing or cut for forage; 7 days for cut grass to be dried and harvested for hay. Retreatment interval 7 days. REI 12 hr. Do not exceed 0.09 lb ai/a lambda-cyhalothrin or 0.2 lb ai/a chlorantraniliprole.
- cyfluthrin (Tombstone) at 0.04 to 0.044 lb ai/a. PHI 0 days. REI 12 hr. Retreatment interval 5 days. Do not exceed 0.176 lb ai/a per season.
- gamma-cyhalothrin (Declare) at 0.01 to 0.015 lb ai/a. PHI 0 days for grazing or cut for forage; 7 days for cut grass to be dried and harvested. REI 24 hr. Do not exceed 0.045 lb ai/a per season.
- hexythiazox (Ruger EC) at 0.078 to 0.186 lb ai/a. PHI 14 days. REI 12 hr. Limit 1 treatment per year. Timothy only.
- malathion (Drexel Malathion 5EC) at 0.9375 to 1.25 lb ai/a. PHI 0 days. REI 12 hr. Limit 2 treatments per cutting. Treatment interval 14 days. Do not treat clover in bloom.

Pasture and grass hay—Thrips
Frankliniella spp. and other species

Pest description and crop damage
On timothy hay or timothy–alfalfa mixed-stand hay crops only. Thrips scar and silver timothy and can reduce hay crop yield.

Management—chemical control
- beta-cyfluthrin (Baythroid XL) at 0.02 to 0.022 lb ai/a. PHI 0 days for grazing or hay. REI 12 hr. Do not exceed 0.089 lb ai/a per season. Retreatment interval 5 days.
- carbaryl (Sevin 4F) at 1 to 1.5 lb ai/a. PHI 14 days. Limit 2 treatments per year. Retreatment interval 14 days. Do not exceed 3 lb ai/a per year. REI 12 hr.
- chlorantraniliprole/lambda-cyhalothrin (Besiege, Voliam Xpress) at 0.59 to 0.98 lb ai/a. PHI 0 days for grazing or cut for forage; 7 days for cut grass to be dried and harvested for hay. Retreatment interval 7 days. REI 12 hr. Do not exceed 0.09 lb ai/a lambda-cyhalothrin or 0.2 lb ai/a chlorantraniliprole.
- cyfluthrin (Tombstone) at 0.041 to 0.044 lb ai/a. PHI 0 days. REI 12 hr. Retreatment interval 5 days. Do not exceed 0.18 lb ai/a per year. Suppression only.
- etofenprox (Zenvex E20) at 0.00175 to 0.007 lb ai/a. Do not exceed 0.18 lb ai/a per year.
- malathion (Drexel Malathion 5EC) at 0.9375 to 1.25 lb ai/a. PHI 0 days. REI 12 hr. Limit 2 treatments per cutting. Treatment interval 14 days. Do not treat clover in bloom.

Pasture and grass hay—Grass scale
Eriococcus insignis

Pasture and grass hay—Harvester ant
Pogonomyrmex spp.
Rangeland Pests

Sergio Arispe

Latest revision—March 2021

In all cases, follow the instructions on the pesticide label. The PNW Insect Management Handbook has no legal status, whereas the pesticide label is a legal document. Read the product label before making any pesticide applications.

Protect pollinators: See How to Reduce Bee Poisoning from Pesticides.

Note: Products are listed in alphabetical order and not in order of preference or superiority of pest control.

Rangeland—Armyworm and cutworm

Many species, including
Army cutworm (Chorizagrotis auxiliaris)
Armyworm (Pseudaelata unipunctata)
Black cutworm (Agrotis ipsilon)
Glassy cutworm (Apamea devastator)

Pest description and crop damage Larvae are 1 to 2 inches long at maturity. All, except glassy cutworm and Protagrotis obscura usually feed above ground on foliage after dark or during conditions of low light intensity.

Management—organic control
♦ Bacillus thuringiensis kurstaki (many commercial products, e.g., Dipel) at 0.5 to 2 lb product/a. PHI 0 days. REI 4 hr. Armyworms only. Most effective on small caterpillars, but use highest recommended rate for fully developed ones. Multiple applications may be necessary for effective control. A spreader sticker may improve performance.
♦ spinosad (Entrust) at 0.63 to 1.25 oz/a. PHI 0 days for forage; 3 days for hay or fodder. Do not apply more than 3.75 oz of Entrust (0.186 lb spinosad) per acre per season or make more than 6 applications per year or 3 applications within 21 days. Follow resistance management guidelines. Armyworms only. OMRI-listed for organic use.

Management—chemical control
♦ beta-cyfluthrin (Baythroid XL) at 0.013 to 0.015 lb ai/a. PHI 0 days for grazing or 7 days for hay. REI 12 hr. Do not exceed 0.089 lb ai/a per season. Armyworms only.
♦ bifenthrin (Brigade 2EC) at 0.1 lb ai/a. Do not exceed 0.2 lb ai/a per season. Retreatment interval: 30 days. REI 12 hr.
♦ chlorantraniliprole (Coragen) at 0.045 to 0.098 lb ai/a. PHI 4 hr. Do not exceed 0.2 lb ai/a or 4 applications per season. Armyworms only.
♦ gamma-cyfluthrin (Declace) at 0.01 to 0.015 lb ai/a. PHI 0 days for grazing. REI 12 hr. Do not exceed 0.045 lb ai/a per season.
♦ lambda-cyhalothrin (Warrior II with Zeon Technology) at 0.015 to 0.03 lb ai/a. PHI 0 days for grazing and foraging; 7 days for hay. REI 12 hr.
♦ malathion at 1.25 to 1.4 lb ai/a. PHI 0 days. REI 12 hr.
♦ zeta-cypermethrin (Mustang Maxx) at 0.014 to 0.025 lb ai/a. PHI 0 days graze and hay; 7 days straw. REI 12 hr.

Rangeland—Grasshopper

Many species, including:
Clearwinged grasshopper (Camnula pellucida)
Lesser migratory grasshopper (Melanopus sanguinipes)
Redlegged grasshopper (Melanoplus femurrubrum)
Twostriped grasshopper (Melanoplus bivittatus)

Pest description and crop damage More than 400 grasshopper species live in the western states, but only 10 to 12 typically cause economic damage. Eggs may be deposited in pastures, field margins, undisturbed areas, or in field stubble, and densities may exceed 1,000/sq ft. Immature and adult insects feed in rangeland, pastures, and crop fields. Damage is severe during outbreaks, with the potential for migratory swarms that may invade nearby crops.

Management—biological control
♦ Nasonia locustae (NOLO Bait Biological Insecticide)—Apply early in the season, as the over-wintering grasshoppers emerge. Two to three weeks may be required for initial effect. Broadcast 1 to 2 lb/acre around the entire infested area, as well as outlying areas such as drying grasses and fields. Heavy infestations may require repeated applications. OMRI-listed for organic use.

Management—chemical control
University of Wyoming website highlighting Ground-Applied Reduced Agent Area Treatment (RAAT) Strategies may help in developing a strategy for grasshopper control. URL http://www.uwyo.edu/entomology/grasshoppers/atraaats.htm or contact Alexandre Latchininsky at 307-766-2298.
♦ beta-cyfluthrin (Baythroid XL) at 0.02 to 0.022 lb ai/a. PHI 0 days for grazing or 7 days for hay. REI 12 hr. Do not exceed 0.089 lb ai/a per cutting.
♦ bifenthrin (Brigade 2EC) at 0.1 lb ai/a. Do not exceed 0.2 lb ai/a per season. Retreatment interval: 30 days. REI 12 hr.
♦ carbaryl (Carbaryl 4L) at 0.5 to 1 quart ai/a. PHI 0 days. Reduced Agent and Area Treatment (RAAT) is required. Do not exceed 1 lb ai/a per crop. REI 12 hr.
♦ lambda-cyhalothrin (Warrior with Zeon Technology, Lambda-Cy) at 0.02 to 0.03 lb ai/a. PHI 0 days for grazing or forage harvest, 7 days for hay. REI 12 hr.

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days if cut for hay. REI 24 hr. Max 0.03 lb ai/a per cutting, 0.09 lb ai/a per season. Do not re-apply sooner than 30 days after last application if a hay crop is not taken.

- malathion ULV at 0.62 lb to 0.9 lb ai/a. PHI 0 days. REI 12 hr. Apply by air when hatch is complete. Do not apply if rain is imminent. Most effective when air is above 70°F.
- malathion (Malathion 8 EC) at 1 to 1.25 pints ai/a. PHI 1 day. REI 12 hr.
- zeta-cypermethrin (Mustang Max) at 0.0175 to 0.025 lb ai/a. PHI 0 days forage or graze. 7 days for straw. Max 0.025 lb ai/a per cutting. Retreatment interval 7 days for forage or graze, 17 days for straw. Do not apply more than 0.01 lb ai/a per season for hay crops, nor more than 0.0125 lb ai/a per season for forage or straw.

Rangeland—Mormon cricket

_Anabrus simplex_

**Pest description and crop damage** Flightless, heavy katydids that feed on many range plants as well as on small grains and alfalfa. They migrate from pastures into crop fields during outbreak years.

**Management—biological control**

- **Nosema locustae** (NOLO Bait Biological Insecticide)—Apply early in the season, as the over-wintering grasshoppers emerge. Two to three weeks may be required for initial effect. Broadcast 1 to 2 lb/acre around the entire infested area, as well as outlying areas such as drying grasses and fields. Heavy infestations may require repeated applications.

**Management—chemical control**

- carbaryl (Carbaryl 4L) at 0.5 quart ai/a. PHI 0 days. Reduced Agent and Area Treatment (RAAT) is required. Do not exceed 1 quart ai/a per year. REI 12 hr.
- carbaryl (Sevin 5 Bait) at 20 lb per acre with no more than one application per year—ground application only.
7 days. Do not exceed 0.05 lb ai/a per cutting nor 0.15 lb ai/a/season.

Vetch hay—Omnivorous leaftier

*Cnephasia longana*

**Pest description and crop damage** Yellow spindle-shaped larvae with brown heads and light stripes on each side of the back. They web and feed within terminal leaves.

**Management—chemical control**

♦ *Bacillus thuringiensis* (Javelin WG) at 0.5 to 1.5 lb/a. PHI 0 days. REI 4 hr. Addition of a spreader sticker may improve performance. Some formulations are OMRI-listed for organic use.

♦ Malathion (Drexel Malathion 5EC) at 0.625 to 1.25 lb ai/a. PHI 0 days. Retreatment interval 14 days. REI 12 hr. Limit 2 treatments per cutting.

♦ Methoxyfenozide (Intrepid 2F) at 0.06 to 0.16 lb ai/a. PHI 0 days. Graze, 7 days hay. REI 4 hr. Do not exceed 0.5 lbs ai/a/yr. Limit 1 treatment per cutting.

♦ Zeta-cypermethrin (Mustang) at 0.028 to 0.05 lb ai/a. PHI 3 days for cutting or grazing, 7 days hay. REI 12 hr. Retreatment interval 7 days. Do not exceed 0.05 lb ai/a per cutting nor 0.15 lb ai/a/season.

Vetch hay—Pea leaf weevil

*Sitona lineata*

**Pest description and crop damage** This is the common, large light-green aphid found on most legumes. Large populations weaken plants, secrete honeydew, and can reduce hay yield.

**Management—chemical control**

♦ Malathion (Drexel Malathion 5EC) at 0.625 to 1.25 lb ai/a. PHI 0 days. REI 12 hr. Retreatment interval 14 days. Limit 2 treatments per cutting. Malathion is more effective at 65°F or above. If bees are in the field, apply malathion in late evening, after bees have returned to hives.

♦ Zeta-cypermethrin (Mustang) at 0.028 to 0.05 lb ai/a. PHI 3 days for cutting or grazing, 7 days seed. REI 12 hr. Retreatment interval 7 days. Do not exceed 0.05 lb ai/a per cutting nor 0.15 lb ai/a/season.

Vetch hay—Slug

**Pest description and crop damage** Primarily a pest in western Oregon and Washington. Damage is most critical when establishing a seedling stand.

**Management—chemical control**

♦ Iron phosphate/spinosad (Bug-N-Sluggo) at 0.1 to 0.45 lb ai/a. PHI 3 days for hay and fodder. Do not exceed 3 treatments in 21 days. OMRI-listed for organic use.

♦ Metaldehyde bait (Deadline) at 0.4 to 1.6 lb ai/a. REI 12 hr.

*See also:*

Slug Control