# Insect Control in Alfalfa (Pure Stands Only) – 2023

*David Owens, Extension Entomologist, University of Delaware (adapted from the Virginia Tech Pest Management Guide, section written by Curt Laub, Research Associate, and Sally Taylor, Assistant Professor, Virginia Tech and Penn State fact sheets written by John Tooker, Professor)*

***NOTE: The label is the law. Be sure to read the label before making any pesticide applications and observe all label restrictions including days from last application to harvest which varies for forage, hay and grazing. Also, to avoid injury to honey bees, do not apply insecticides during bloom.***

***Tolerances for chlorpyrifos were revoked in February 2022. It is illegal to use on alfalfa.***

***OLF = Other labeled formulations; see table at end of guide***

## Alfalfa Weevil

**I. Sampling:** Alfalfa weevil eggs begin hatching around 100 growing degree days (base 48°F). This typically occurs in mid-late March, but may be earlier following mild winters. Continue sampling weekly until first cutting. Fields should also be checked within one week of the first cutting for both larval and adult damage to the re-growth. During the first visit, examine 5-10 stems for damage and larvae. A full stem sample is not needed until damage or larvae are found on the plants. If leaf feeding is present, randomly collect 30 stems from throughout the field. Grasp stems at the base and place each stem upside down in a bucket. After collecting the stems, separate them into 3 or 4 bundles and beat them against the inside of the bucket to dislodge larvae from the stems. Count and record all larvae found per 30 stems. If the weather is cold or small larvae are present, they may be sheltering deep in terminals and difficult to dislodge. Measure 10 of the 30 stems and record the average stem height. Also, note if buds or flowers are present to determine the percentage of plants in the bud or flower stage.

**2. Decision Making:** As a general guideline, the following thresholds can be used to make a treatment decision:

| Average Stem Height (inches) | # Weevil Larvae per Stem |
|---|---|
| 0-11 | 0.7 |
| 12 | 1.0 |
| 13-15 | 1.5 |
| 16 | 2.0 |
| 17-18 | 2.5 |

A recent model accounting for value of the crop and control costs per acre may help refine decision making. Below are thresholds for the number of weevil **larvae per 30 stems**.

| Value of Hay ($/ton) | | Plants 12-18 inches AND Control costs ($/acre) | | | | Plants 18-24 inches AND Control costs ($/acre) | | | | Plants 24-30 inches AND Control costs ($/acre) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | $12 | $14 | $16 | $20 | $12 | $14 | $16 | $20 | $12 | $14 | $16 | $20 |
| | $120 | 68 | 79 | 91 | 114 | 75 | 87 | 100 | 124 | 78 | 91 | 105 | 130 |
| | $140 | 59 | 68 | 77 | 99 | 64 | 75 | 86 | 107 | 67 | 78 | 90 | 112 |
| | $160 | 51 | 60 | 68 | 86 | 56 | 65 | 75 | 93 | 58 | 68 | 79 | 98 |
| | $180 | 45 | 52 | 60 | 77 | 50 | 58 | 67 | 84 | 52 | 61 | 70 | 87 |
| | $200 | 41 | 48 | 54 | 69 | 45 | 52 | 60 | 76 | 47 | 55 | 63 | 79 |
| | $220 | 37 | 43 | 49 | 63 | 41 | 47 | 55 | 69 | 42 | 50 | 57 | 72 |
| | $240 | 34 | 40 | 45 | 58 | 37 | 43 | 50 | 63 | 39 | 46 | 53 | 66 |
| | $260 | 31 | 37 | 42 | 54 | 35 | 40 | 46 | 59 | 36 | 43 | 49 | 61 |
| | $280 | 29 | 34 | 39 | 50 | 32 | 37 | 43 | 55 | 33 | 40 | 45 | 56 |
| | $300 | 27 | 32 | 36 | 47 | 30 | 35 | 40 | 51 | 31 | 37 | 42 | 53 |
| | $320 | 26 | 30 | 34 | 44 | 28 | 33 | 38 | 48 | 29 | 35 | 40 | 49 |
| | $340 | 24 | 28 | 32 | 41 | 26 | 31 | 36 | 45 | 27 | 33 | 37 | 46 |
| | $360 | 23 | 26 | 30 | 39 | 25 | 29 | 34 | 43 | 26 | 31 | 35 | 44 |
| | $380 | 22 | 25 | 28 | 37 | 24 | 27 | 32 | 41 | 24 | 29 | 33 | 42 |
| | $400 | 20 | 24 | 27 | 35 | 22 | 26 | 30 | 39 | 23 | 28 | 32 | 39 |

If alfalfa is in the full-bud stage and economic levels are present, early harvest is an alternative to spraying. If harvest is not possible within 3 days and populations are increasing, use a short residual insecticide. If economic levels of alfalfa weevil are present before harvest and you decide to cut instead of spray, be sure to check fields within one week of cutting for damage to the re-growth. If temperatures remain cool after cutting, there is often not enough "stubble heat" to control populations with early cutting. In some cases, damage to re-growth can be significant. As a general guideline, a stubble treatment may be needed if you find 2 or more weevils per stem and the population levels remain steady.

**Notes:** Under drought stress, thresholds should be lowered by about 0.5 weevils per stem.
For mixed stand alfalfa, treatment is not recommended if the proportion of alfalfa in a stand is below 50%. Adjust thresholds for the alfalfa proportion of the stand accordingly.
Early harvest should only be done once during the growing season to avoid reducing stand or longevity.

| **Insecticides Labeled for Alfalfa Weevil** | | | | | | |
|---|---|---|---|---|---|---|
| **Product** | **MOA Group** | **Active ingredient** | **Amount product per acre** | **PHI (days)** | **REI (hours)** | **Remarks** |
| Carbaryl 4L | 1A | carbaryl | 1.5 qt. | 7 | 12 | CAUTION May cause temporary bleaching, does not control adults |
| Lannate LV* | 1A | methomyl | 3.0 pt. | 7 | 48 | DANGER |
| Imidan 70-W | 1B | phosmet | 1.0 to 1.3 lb. | 7 | 5 days | WARNING |
| Fastac* | 3 | alpha-cypermethrin | 2.2 to 3.8 fl. oz. | Cutting/ grazing: 3 seed: 7 | 12 | DANGER |

| | | | | | | |
|---|---|---|---|---|---|---|
| Baythroid XL* | 3 | beta-cyfluthrin | 1.6 to 2.8 fl. oz. | 7 | 12 | WARNING |
| Tombstone 2EC* | 3 | cyfluthrin | 1.6 to 2.8 fl. oz. | 7 | 12 | DANGER |
| Declare* | 3 | gamma-cyhalothrin | 1.02 to 1.54 fl. oz. | Forage harvest: 1 Hay harvest: 7 | 24 | CAUTION |
| Warrior II* or OLF | 3 | lambda-cyhalothrin | 1.28 to 1.92 fl. oz. | Forage harvest: 1 Hay harvest: 7 | 24 | WARNING |
| Pounce 25WP* or OLF | 3 | permethrin | 6.4 to 12.8 oz. | ≤0.1 lb. AI/A (6.4 oz): 0 d > 0.1 lb. AI/A: 14 d | 12 | CAUTION |
| Mustang Maxx* | 3 | zeta-cypermethrin | 2.24 to 4.0 fl. oz. | 3 | 12 | WARNING |
| Steward EC | 22 | indoxacarb | 6.7 to 11.3 fl. oz. | 7 | 12 | GENERAL USE |

*Restricted Use Pesticide

Notes: Dimethoate is also labeled for alfalfa weevil suppression. It is inconsistent by itself. Use with caution or tank-mix with a pyrethroid. Besiege (chlorantraniliprole + lambda cyhalothrin) is also labeled BUT chlorantraniliprole is not effective on alfalfa weevil, only the lambda cyhalothrin component is, thus there is no extra benefit for alfalfa weevil control over using a lambda-cyhalothrin containing product by itself.

## Potato Leafhopper

**1. Sampling:** On new spring plantings, begin sampling by mid-May, or as soon as plants are 3 inches tall. On established stands, begin sampling within a week after the first cutting and continue on a weekly basis until the final harvest. Take sweep net samples any time during the day as long as the foliage is dry. Take 10 sweeps in each of 10 locations to determine the number of leafhoppers per 100 sweeps. Examine 20 random stems to determine the plant height and plant growth stage.

**2. Decision Making:** As a general guideline, the following thresholds can be used to make a leafhopper control decision. Keep in mind that fields may vary considerably in plant response to the leafhopper feeding depending on soil moisture, fertility, and cultivar.

**3. Resistant Varieties:** Cultivars with leafhopper resistance have glandular trichomes that trap nymphs. The most recently released varieties have as much as 75% resistance to leafhopper. Sprays may still be warranted during the seeding year, but could prevent the need to treat once stands are established. Leafhopper resistant varieties are not the same as non-yellowing varieties. Non-yellowing varieties still suffer damage.

If alfalfa is more than 60 percent bud or flowering, consider harvesting in the next 7 days to avoid spraying. In this situation, the field should be re-sampled soon after harvest to determine the need for control. If the field cannot be harvested in 7 days and economic population levels are present, apply a short residual insecticide. If the alfalfa has experienced “hopper burn,” significant yield loss has already occurred and the field should be cut instead of sprayed. Leafhopper applications are rarely economical if plants are taller than 12 inches. Harvesting kills most nymphs and many adults. Adults that are not killed tend to disperse away from the field. Thus, stubble sprays are rarely necessary.

Economic threshold for potato leafhopper, average number of leafhoppers **per 100 sweeps**

| Value of Hay ($/ton) | Plants 0 to 4 inches AND Control costs ($/acre) | | | | Plants 4 to 8 inches AND Control costs ($/acre) | | | | Plants 8 to 12 inches AND Control costs ($/acre) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $12 | $14 | $16 | $20 | $12 | $14 | $16 | $20 | $12 | $14 | $16 | $20 |
| $120 | 34 | 37 | 38 | 50 | 50 | 53 | 69 | 85 | 142 | 173 | 210 | 249 |
| $140 | 30 | 32 | 35 | 43 | 43 | 45 | 57 | 70 | 121 | 149 | 178 | 208 |
| $160 | 27 | 29 | 30 | 38 | 38 | 38 | 49 | 60 | 105 | 131 | 155 | 177 |
| $180 | 25 | 26 | 27 | 33 | 33 | 34 | 42 | 52 | 93 | 116 | 137 | 154 |
| $200 | 23 | 24 | 25 | 30 | 30 | 30 | 37 | 46 | 84 | 105 | 123 | 136 |
| $220 | 21 | 22 | 23 | 27 | 27 | 27 | 33 | 41 | 76 | 96 | 111 | 122 |
| $240 | 20 | 20 | 21 | 25 | 25 | 26 | 30 | 37 | 69 | 88 | 101 | 110 |
| $260 | 19 | 19 | 20 | 23 | 23 | 24 | 27 | 34 | 64 | 81 | 93 | 100 |
| $280 | 18 | 18 | 19 | 21 | 21 | 22 | 25 | 31 | 59 | 76 | 86 | 92 |
| $300 | 17 | 17 | 18 | 20 | 20 | 21 | 23 | 29 | 55 | 71 | 80 | 84 |
| $320 | 16 | 16 | 17 | 19 | 19 | 20 | 21 | 27 | 51 | 66 | 75 | 78 |
| $340 | 15 | 15 | 16 | 17 | 17 | 18 | 19 | 25 | 48 | 63 | 70 | 73 |
| $360 | 14 | 14 | 15 | 17 | 17 | 17 | 18 | 23 | 45 | 59 | 66 | 68 |
| $380 | 14 | 14 | 15 | 16 | 16 | 16 | 17 | 22 | 43 | 56 | 62 | 64 |
| $400 | 13 | 13 | 14 | 15 | 15 | 15 | 16 | 20 | 41 | 53 | 59 | 60 |

| **Insecticides Labeled for Control of Potato Leafhopper** | | | | | | |
|---|---|---|---|---|---|---|
| **Product** | **MOA Group** | **Active ingredient** | **Amount product per acre** | **PHI (days)** | **REI (hours)** | **Remarks** |
| Dimethoate 400 | 1B | dimethoate | 0.5 to 1.0 pt. | 10 | 48 | WARNING |
| Imidan 70-W | 1B | phosmet | 1.0 to 1.3 lb. | 7 | 5 days | WARNING Do not apply to blooming alfalfa |
| Fastac* | 3 | alpha-cypermethrin | 2.2 to 3.8 fl. oz. | Cutting/ grazing: 3 Harvest seed: 7 | 12 | DANGER |
| Baythroid XL* | 3 | beta-cyfluthrin | 0.8 to 1.6 fl. oz. | 7 | 12 | WARNING |
| Tombstone 2EC* | 3 | cyfluthrin | 0.8 to 1.6 fl. oz. | 7 | 12 | DANGER |
| Declare* | 3 | gamma-cyhalothrin | 0.77 to 1.28 fl. oz. | Forage: 1 Hay harvest: 7 | 24 | CAUTION |
| Warrior II* or OLF | 3 | lambda-cyhalothrin | 0.96 to 1.60 fl. oz. | Forage harvest: 1 Hay arvest: 7 | 24 | WARNING |

| | | | | | | |
|---|---|---|---|---|---|---|
| Pounce 25WP* or OLF | 3 | permethrin | 6.4 to 12.8 oz. | ≤0.1 lb. AI/A (6.4 oz): 0 d > 0.1 lb. AI/A: 14 d | 12 | CAUTION |
| Mustang Maxx* | 3 | zeta- cypermethrin | 2.24 to 4.0 fl. oz. | 3 | 12 | RESTRICTED USE |
| Sivanto prime | 4D | flupyradifurone | 7 to 14 fl. oz. | 7 | 4 | CAUTION |
| Sefina | 9D | afidopyropen | 3.0 to 6.0 fl oz | 0 | 12 | CAUTION |

*Restricted Use Pesticide

## Grasshoppers

| Insecticides Labeled for Control of Grasshoppers | | | | | | |
|---|---|---|---|---|---|---|
| **Product** | **MOA Group** | **Active ingredient** | **Amount product per acre** | **PHI (days)** | **REI (hours)** | **Remarks** |
| Malathion 57 EC | 1B | malathion | 1.5 to 2.0 pt. | 0 | 12 | CAUTION |
| Baythroid XL* | 3 | beta-cyfluthrin | 2.0 to 2.8 fl. oz. | 7 | 12 | WARNING |
| Tombstone* | 3 | cyfluthrin | 2.0 to 2.8 fl. oz. | 7 | 12 | DANGER |
| Fastac* | 3 | alpha-cypermethrin | 2.8 to 3.8 fl. oz. | Cutting/ grazing: 3 Harvest seed: 7 | 12 | DANGER |
| Warrior II* or OLF | 3 | lambda-cyhalothrin | 1.28 to 1.92 fl. oz. | Forage harvest: 1 Hay harvest: 7 | 24 | WARNING |
| Mustang Maxx* | 3 | zeta-cypermethrin | 2.8 to 4.0 fl. oz. | 3 | 12 | WARNING |
| Coragen Prevathon Vantacor | 28 | chlorantraniliprole | 2 to 5 fl. oz. 14 to 20 fl. oz 0.7 to 1.7 fl. oz | 0 | 4 | CAUTION use with MSO 1% v/v to improve efficacy |
| Besiege* | 28 + 3 | chlorantraniliprole + lambda-cyhalothrin | 6.0 to 10.0 fl oz | 1 d Forage 7 d Hay | 24 | WARNING |

*Restricted Use Pesticide

Armyworms and Cutworms – These insects may impact stand establishment.

| Insecticides Labeled for Control of Armyworms and Cutworms | | | | | | |
|---|---|---|---|---|---|---|
| **Product** | **MOA Group** | **Active ingredient** | **Amount product per acre** | **PHI (days)** | **REI (hours)** | **Remarks** |
| Baythroid XL* | 3 | beta-cyfluthrin | 1.6 to 2.8 fl. oz. | 7 | 12 | WARNING Effective against small armyworm larvae up to 2nd instar |
| Tombstone* | 3 | cyfluthrin | 0.8 to 1.6 fl. oz. | 7 | 12 | DANGER Effective against small armyworm larvae up to 2nd instar |
| Fastac* | 3 | alpha-cypermethrin | 2.2 to 3.8 fl. oz. | Cutting/ grazing: 3 Harvest seed: 7 | 12 | DANGER |
| Declare* | 3 | gamma-cyhalothrin | 0.77 to 1.54 fl. oz. | Forage harvest: 1 Hay harvest: 7 | 24 | CAUTION |
| Warrior II* or OLF | 3 | lambda-cyhalothrin | 1.28 to 1.92 fl. oz. | Forage harvest: 1 Hay harvest: 7 | 24 | WARNING |
| Pounce 25WP* or OLF | 3 | permethrin | 3.2 to 12.8 oz. | ≤0.1 lb. AI/A (6.4 oz): 0 d > 0.1 lb. AI/A: 14 d | 12 | CAUTION |
| Mustang Maxx* | 3 | zeta-cypermethrin | 2.8 to 4.0 fl. oz. | 3 | 12 | WARNING |
| Besiege* | 28 + 3 | chlorantraniliprole + lambda-cyhalothrin | 5.0 to 10.0 fl oz | 1 d Forage 7 d Hay | 24 | WARNING |

*Restricted Use Pesticide

## Other Defoliating Worms

Other worm species may occasionally build up in alfalfa and cause significant defoliation during the summer months. These include but are not limited to green cloverworm, loopers, alfalfa webworm, and various armyworm species. If armyworm is suspected, identify the species present to make sure that you do not select a pyrethroid on beet armyworm. Beet armyworm is resistant to pyrethroids.

| Insecticides Labeled for Control of Various Lepidopteran Worm Species | | | | | | |
|---|---|---|---|---|---|---|
| **Product** | **MOA Group** | **Active ingredient** | **Amount product per acre** | **PHI (days)** | **REI (hours)** | **Remarks** |
| Baythroid XL* | 3 | beta-cyfluthrin | 1.6 to 2.8 fl. oz. | 7 | 12 | WARNING<br>Effective against small armyworm larvae up to 2nd instar |
| Tombstone* | 3 | cyfluthrin | 0.8 to 2.8 fl. oz. | 7 | 12 | DANGER<br>Effective against small armyworm larvae up to 2nd instar |
| Fastac* | 3 | alpha-<br>cypermethrin | 2.2 to 3.8 fl. oz. | Cutting/ grazing: 3<br>Harvest seed: 7 | 12 | DANGER |
| Declare* | 3 | gamma-cyhalothrin | 0.77 to 1.54 fl. oz. | Forage harvest: 1<br>Hay harvest: 7 | 24 | CAUTION |
| Warrior II*<br>or OLF | 3 | lambda-cyhalothrin | 0.96 to 1.92 fl. oz. | Forage harvest: 1<br>Hay harvest: 7 | 24 | WARNING |
| Pounce 25WP*<br>or OLF | 3 | permethrin | 3.2 to 12.8 oz. | ≤ 0.1 lb. AI/A: 0<br>> 0.1 lb. AI/A: 14 | 12 | CAUTION |
| Mustang Maxx* | 3 | zeta-cypermethrin | 2.4 to 4.8 fl oz. | 3 | 12 | WARNING |

| | | | | | | |
|---|---|---|---|---|---|---|
| Intrepid 2F | 18 | methoxyfenozide | 4.0 to 10.0 fl oz | 7 (mixed stand) 0 d Forage 3 d (<8 fl oz, alfalfa only) | 4 | CAUTION |
| Coragen<br>Prevathon<br>Vantacor | 28 | chlorantraniliprole | 2 to 5 fl. oz.<br>14 to 20 fl. oz<br>0.7 to 1.7 fl. oz | 0 | 4 | CAUTION<br>use with MSO 1% v/v to improve efficacy |
| Besiege* | 28 + 3 | Chlorantraniliprole + lambda-cyhalothrin | 5.0 to 10.0 fl oz | 1 d Forage 7 d Hay | 24 | WARNING |

*Restricted Use Pesticide

## Pea Aphid

1. **Sampling/Decision Making:** The need to treat for pea aphids is rare (1 year in 10) in the Mid-Atlantic because lady bird beetles, wasp parasites, and other beneficial insects usually control this pest. The best sampling technique requires the same 15-inch sweep net used for potato leafhoppers. Ten sweeps at 10 random locations should be used to sample both the aphids and beneficials. If 50 or more aphids per sweep are collected and no beneficials are present, it is recommended that the field be cut early. Avoid spraying first crop because sprays will kill alfalfa weevil parasites.

| **Insecticides Labeled for Control of Pea Aphid** | | | | | | |
|---|---|---|---|---|---|---|
| **Product** | **MOA Group** | **Active ingredient** | **Amount product per acre** | **PHI (days)** | **REI (hours)** | **Remarks** |
| Lannate LV* | 1A | methomyl | 1.5 to 3.0 pt. | 7 | | DANGER |
| Dimethoate 400 or OLF | 3 | dimethoate | 0.5 to 1.0 pt. | 10 | | CAUTION |
| Malathion 57EC | 1B | malathion | 1.5 to 2.0 pt. | 0 | | CAUTION |
| Transform WG | 4C | sulfoxaflor | 0.75 to 1.0 oz | 7 | 24 | DANGER |
| Sivanto Prime | 4D | flupyradifurone | 7.0 to 14.0 fl oz | 7 | 4 | CAUTION |
| Sefina | 9D | afidopyropen | 3.0 to 6.0 fl oz | 0 | 12 | CAUTION |

*Restricted Use Pesticide

Please note that numerous pyrethroid (group 3) insecticides are labeled for pea aphid control but are not recommended based upon UD spray trial results after aphid populations were flared by pyrethroid use targeting alfalfa weevil.

## Blister Beetles

Pay attention to flowering alfalfa for blister beetles. There are a couple of species that are commonly found in alfalfa. All are cigar shaped and with a prothorax that is narrower than both the head and the abdomen giving them a distinctive 'neck'. Blister beetles can be highly toxic to horses and should be avoided when cutting hay. There are no thresholds for blister beetles. Insecticides can reduce live blister beetles, but if the dead insect does not fall completely out of the canopy, it could still cause problems in the cut forage. Nebraska's Gary Stone writes that 'haying equipment without conditioners has shown to reduce the number of dead beetles. If hay is harvested in this manner and allowed to dry in windrows, the majority of beetles can move out. Sicklebar mowers however will crush the beetles. Blister beetles tend to be more concentrated near field edges.

## Other Labeled Formulations

OLF's include but are not limited to the following products. Rates and use patterns may not be the same as the brand name. Read labels thoroughly.

| Active Ingredient | OLF (Manufacturer) | OLF (Manufacturer) |
|---|---|---|
| Methomyl | Lanveer LV (Innvictis Crop Care) | Nudrin LV (Albaugh) |
| Permethrin | Arctic 3.2 EC (WinField United)<br>Perm-Up 3.2 EC (UPL) | Permethrin (Loveland) |
| Lambda Cyhalothrin | Province II (Tenkoz)<br>Crusader (Albaugh)<br>Kendo (Helm Agro)<br>Lambda-Cy EC (UPL)<br>Province II (Tenkoz)<br>Willowood Lambda-Cy 1 EC (Generic Crop Science) | Cavalry II (Growmark)<br>Grizzly Too (WinField United)<br>L-C Insecticide (Drexel)<br>LambdaStar (LG Life Science)<br>Silencer (Adama)<br>Paradigm VC (WinField United) |
| Dimethoate | Dimethoate 400 (Drexel and Loveland)<br>Dimethoate 4 EC (Drexel) | Dimethoate 2.67 EC (Drexel and Loveland)<br>Dimethoate LV-4 (Drexel) |
| Methoxyfenozide | Invertid 2F (Loveland) | Zylo (UPL) |
| Malathion | Fyfanon 57 EC (FMC) | Malathion 8 F (Gowan) |
| | Malathion 5 (WinField United) | Malathion 5 EC (Drexel) |