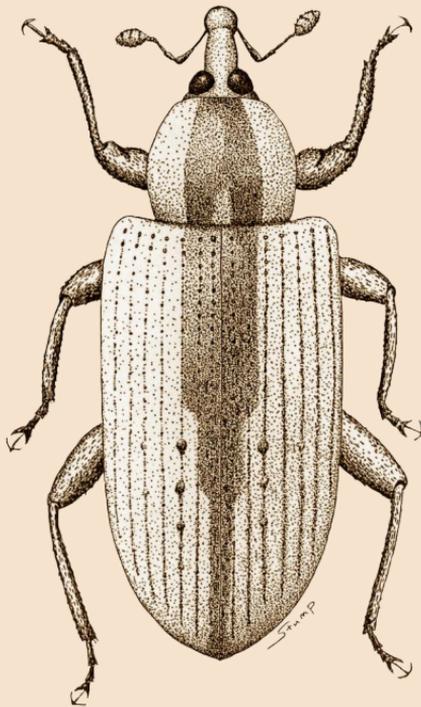


INSECTS ^{IN} WYOMING ALFALFA

COMMON PESTS AND BENEFICIAL INSECTS



ALLISON JONES, MAKENZIE PELLISSIER
and RANDA JABBOUR

B-1275
December 2015

 UNIVERSITY OF WYOMING
EXTENSION

CONTENTS

● Pests.....	3
● Leaf Chewers.....	4
● Sap Suckers.....	10
● Other.....	13
● Beneficials.....	15
● Parasites.....	16
● Predators.....	17
● Pollinators.....	25
● More Information.....	26
● About The Authors.....	29
● Photography Cited.....	30
● References.....	32

PESTS

Insects are considered to be pests when they cause damage to crops. Common kinds of crop damage include leaf chewing, sap sucking, and transmitting disease. Common signs of crop damage include seedling death, stunted growth, skeletonization, and other leaf deformity. The insects listed in this section cause damage to alfalfa, but may not all cause damage that is economically significant.

Identifying what insect is causing damage is the first step in developing a management plan.



Chewing damage on alfalfa from alfalfa weevil larvae.

Alfalfa Weevils (*Hypera postica*)

Order Coleoptera; Family Curculionidae



Alfalfa weevil larva ¹ and alfalfa weevil adult ²

Size: Larvae are $\frac{3}{8}$ inch at maturity. Adults are $\frac{1}{4}$ inch.

Appearance: Adults are brown-bodied with a darker brown stripe on their back and have a snout-shaped nose. Larvae are green with a white stripe on their back and a black head capsule.

Damage: Adults and larvae chew holes in leaves. In heavier infestations, larvae leave behind only skeletonized stems.

Alfalfa weevil is the primary pest in Wyoming hay alfalfa. It is an early-season pest, typically causing damage from May to July.



Actual Size

CONTENTS

Clover Root Curculio (*Sitona hispidulus*)

Order Coleoptera; Family Curculionidae

Clover root curculio ^{3,4}

Size: Adults and larvae are both less than $\frac{1}{4}$ inch.

Appearance: Often confused with alfalfa weevil, clover root curculio adults and larvae are smaller with different coloring. Adults are brown but, unlike alfalfa weevil, they do not have a brown stripe on their back. Larvae are white, whereas alfalfa weevil larvae are green.

Behavior: Larvae feed on and damage the taproot of alfalfa. Adults feed on alfalfa leaves. Clover root curculio is not an economically significant pest in Wyoming.



Flea Beetles (tribe Alticini)

Order Coleoptera; Family Chrysomelidae



Palestriped flea beetle ⁵ and flea beetle ⁶

Size: $\frac{1}{10}$ - $\frac{1}{8}$ inch.

Appearance: Black, brown or striped body. Flea beetles have relatively large hind legs.

Behavior: Feed on leaves, making small “shotholes”. Flea beetles are named for their characteristic jumping behavior, which resembles that of jumping fleas.



Actual Size

CONTENTS

Grasshoppers

Order Orthoptera, Family Acrididae



Two-striped grasshopper ⁷

Size: ¼ - 1 ½ inches.

Appearance: Green to brown body, with short antennae and large hind legs (for jumping).

Damage: Some species feed on alfalfa leaves and stems. The severity of damage varies significantly between species.

Behavior: Generally move into alfalfa along field edges from surrounding rangeland.

Blister beetle larvae feed on grasshopper eggs, which explains why grasshopper outbreaks can be a warning sign for blister beetle outbreaks and why blister beetles are also more common in alfalfa located near rangeland.

CONTENTS



Actual Size

Armyworms and Cutworms

Order Lepidoptera; Family Noctuidae



Army cutworm larva ⁸ and army cutworm pupa ⁹

Armyworms and cutworms all belong to the family Noctuidae, a large group of moths. Multiple species of these moths cause damage to alfalfa as caterpillars, but the following description refers to the army cutworm (*Euxoa auxiliaris*), as it is the most significant pest in this area. Other species are similar in appearance and behavior.

Size: Larvae are 1½ - 2 inches at maturity. Adult moths are 1½ - 1¾ inches across.

Appearance: Larvae are gray or brown with light stripes, depending on species. Adult moths are brown.

Damage: Larvae feed on alfalfa leaves. Damage appears as skeletonized stems.

Behavior: Avoid sunlight, often causing damage at night. During the day, they find shelter in soil, soil cracks, and leaf litter. Therefore they can be difficult to spot in crop fields.



Actual Size

CONTENTS

Alfalfa Caterpillars (*Colias eurytheme*)

Order Lepidoptera; Family Pieridae



Alfalfa caterpillar ¹⁰ and alfalfa butterfly ¹¹

Size: Larvae are 1½ inches at maturity. Adult butterflies are 1⅜ - 2¾ inches across

Appearance: Larvae are velvety green with a thin, white stripe. Adult butterflies are shades of yellow with other markings, which vary depending on gender.

Damage: Larvae feed on entire leaves.

Behavior: Adults lay eggs in alfalfa that is less than 6 inches tall. New generations of caterpillars are closely linked to the hay cutting cycle.



Aphids

Order Hemiptera; Family Aphididae



Left: Pea aphid. ¹² Top Right: Spotted alfalfa aphid. ¹³ Bottom Right: Cowpea aphid. ¹⁴

Size: Ranging from $\frac{1}{8}$ - $\frac{1}{4}$ inch, depending on species. The four species commonly found in alfalfa are pea aphids, spotted alfalfa aphids, blue alfalfa aphids, and cowpea aphids.

Appearance: Yellow, green, or black body with long antenna and cornicles, which are the two small tubes at the end of the top side of the abdomen.

Damage: Feeding on sap causes stunting and defoliation and can vector disease. Aphids also secrete honeydew, a sugary substance, that is a substrate for sooty mold.



Lygus Bugs (Genus *Lygus*)
Order Hemiptera; Family Miridae



Top: Tarnished plant bug ¹⁵ and tarnished plant bug nymph. ¹⁶ **Bottom:** Pale legume bug. ¹⁷

Size: $\frac{3}{8}$ inch.

Appearance: Adults are brown or green, with wings that have veination toward the base, but are clear at the end. Immature lygus bugs are often mistaken for aphids; however, lygus nymphs have 1-5 black spots on their back and do not have cornicles.

Damage: Cause stunted growth and the appearance of crinkled or puckered leaves. Lygus are primarily a pest in seed alfalfa, as they cause damage to developing flower buds.



Actual Size

Potato Leafhoppers (*Empoasca fabae*)

Order Hemiptera; Family Cicadellidae

Size: ¼ inch.

Appearance: Light green, wedge-shaped body.

Damage: Cause yellowing of alfalfa leaves. Not an economically significant pest in Wyoming, as populations remain small because of the cold winter climate.



Potato leafhopper ¹⁸



Actual Size

Alfalfa Plant Bugs (*Adelphocoris lineolatus*)

Order Hemiptera; Family Miridae



Alfalfa plant bug ¹⁹ and alfalfa plant bug nymph ²⁰

Size: ¼ - ½ inch.

Appearance: Green body with partially clear wings. Resembles lygus bug with slightly longer body. Nymphs do not have spots on back.

Damage: Feeds on plant sap and causes damage to developing flower buds. Not an economically significant pest in Wyoming.



Actual Size

Blister Beetles

Order Coleoptera; Family Meloidae



Blister beetle ²¹

Size: $\frac{3}{4}$ - 1½ inches.

Appearance: Narrow, solid black, solid gray or black-and-yellow striped body, with abdominal segments extending past wings.

Damage: Feeding does not significantly damage alfalfa, but alfalfa contaminated by blister beetles when cut for hay can poison livestock, particularly horses. This is because blister beetles contain cantharidin, a toxic chemical.

Behavior: Beetles are commonly found in groups around field edges and generally leave a field after a day or two. They are attracted to blooming plants.



Actual Size

BENEFICIALS

Insects are considered beneficial when they assist in the production of crops. Common services provided by beneficial insects and other arthropods, like spiders, are parasitism, predation and pollination. Some beneficial insects directly benefit a crop. For example, pollinators are essential for seed production. Some insects benefit a crop by killing crop pests, as is the case with parasites and predators.



Lady beetles are beneficial predators.

Parasitoid Wasps

Order Hymenoptera; Families Ichneumonidae and Braconidae



Braconid wasp attacking lygus bug nymphs ²²

Size: Generally ½ inch or smaller. Some wasps can be difficult to see without magnification.

Appearance: Light-to-dark brown or black body with a thin waist and long antennae.

Behavior: Female wasps lay their eggs in insect hosts. Those eggs develop into wasp larvae, which feed on, and eventually kill, their host. Alfalfa weevil, aphids, and lygus bugs can all fall victim to various species of wasps. Thus, parasitoid wasps are important biological control agents in alfalfa.

Adult wasps depend on sugary substances such as flower nectar and aphid honeydew for food.



Actual Size



CONTENTS

Minute Pirate Bugs

Order Hemiptera; Family Anthocoridae

Size: 1/5 inch.

Appearance: Black body with partially clear and partially black wings, and piercing-sucking mouthparts.

Behavior: Feed on small insects, including aphids and insect eggs.



Minute pirate bug²³



Actual Size

Big-Eyed Bugs (Genus *Geocoris*)

Order Hemiptera; Family Geocoridae

Size: 1/8 - 1/4 inch.

Appearance: Large eyes, which are set relatively wide compared to other hemipterans, and piercing-sucking mouthparts.

Behavior: Feed on small insects including aphids and insect eggs.



Big-eyed bug (left)²⁴



Actual Size

Damsel Bugs (Genus *Nabis*)

Order Hemiptera; Family Nabidae



Damsel bug ²⁵ and damsel bug nymph ²⁶

Size: $\frac{3}{8}$ inch.

Appearance: Slender, tan body. Piercing-sucking mouthparts. Nymphs are similar to adults in shape, but are smaller and do not have wings.

Behavior: Predator of aphids, potato leafhoppers, and lygus bugs.



Actual Size

CONTENTS

Lady Beetles

Order Coleoptera; Family Coccinellidae



Lady beetle ²⁷ and lady beetle larva ²⁸

Size: 1/8-3/4 inch.

Appearance: Adults are round-bodied, typically red or orange with black spots. Larvae are dark-colored and alligator-shaped.

Behavior: Both adults and larvae feed on aphids and other soft-bodied insects.

Some species of lady beetles eat hundreds of aphids in a day. Lady beetles generally remain in one location until they have completely consumed an aphid colony and then move on to another location.



Actual Size

Carabid Beetles

Order Coleoptera; Family Carabidae



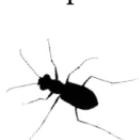
Top: Ground beetle. ²⁹ **Bottom:** Tiger beetle. ³⁰

Size: ¼ - 1½ inches.

Appearance: Usually brown or black body, although some species are iridescent green or purple. Ground beetles have medium-length, thread-like antennae.

Behavior: Many species are generalist predators of aphids, weevils, and army cutworm. Other species consume weed seeds.

Actual Size



CONTENTS

Soldier Beetles

Order Coleoptera; Family Cantharidae



Blister beetles (left) and soldier beetles (right) ³¹ and colorado plains soldier beetle ³²

Size: ½ inch.

Appearance: Long slender body, with various color patterns. They often resemble both fireflies and blister beetles in body shape and coloration; however, fireflies have most of their head covered by their pronotum (neck), and blister beetles have a more square-shaped head and a smaller pronotum.

Behavior: Feed on small insects, pollen and nectar. They are attracted to blooming plants. Like blister beetles, soldier beetles also produce cantharidin, a toxic chemical.



Hoverflies

Order Diptera; Family Syrphidae



Top: Hover fly.³³ Bottom: Hover fly³⁴ and Hover fly larva.³⁵

Size: $\frac{1}{8}$ – $\frac{3}{8}$ inch.

Appearance: Often mimic bees in coloration. Many species are yellow and black. Some have hair like bumblebees. These flies can be distinguished from bees in that they have short antennae and only two wings, rather than four.

Behavior: Larvae of some species eat aphids and other soft-bodied insects. Adults feed on pollen and nectar. They are attracted to blooming plants.



Actual Size

CONTENTS

Green Lacewings

Order Neuroptera; Family Chrysopidae



Top: Green lacewing.³⁶ **Bottom:** Green lacewing larva³⁷ and green lacewing eggs.³⁸

Size: Larvae are $\frac{1}{8}$ - $\frac{4}{5}$ inch. Adults are approximately $\frac{3}{4}$ inch.

Appearance: Larvae are tan and resemble lady beetle larvae but have larger jaws. Adults have a light green body with long, lacy wings.

Behavior: Larvae eat aphids and other small insects. Adults feed on nectar and pollen.



Actual Size

Spiders

Class Arachnida; Order Araneae



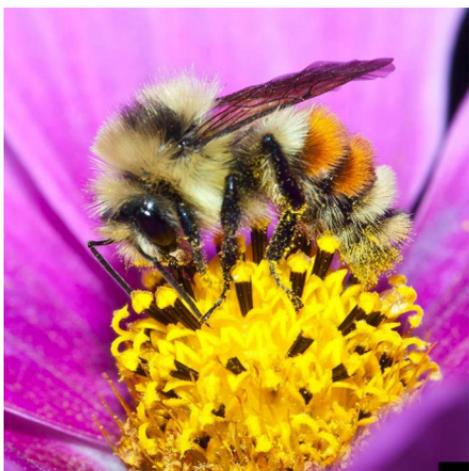
Long jawed orb weaver ³⁹ and crab spider ⁴⁰

All spiders are predacious. Most spiders feed on insects and are therefore generally considered beneficial predators in crop land. Spiders come in a variety of shapes, colors, and sizes. Unlike insects, spiders have eight legs and two body parts (a head and an abdomen). Insects have six legs and three body parts (head, thorax, and abdomen).



Actual Size

CONTENTS



Top: Hunt bumble bee ⁴¹ and alfalfa leafcutting bee. ⁴² **Bottom:** Sweat bee ⁴³ and Western swallowtail butterfly. ⁴⁴

Pollinators are a group of beneficial insects that fertilize wildflowers and many types of flowering crops, including alfalfa. Leafcutting bees and honey bees are two examples of pollinators released in seed alfalfa fields, but these are only two of many types of pollinators. These include other bee species, butterflies, moths, flies, and even beetles.

SUPPORTING BENEFICIAL INSECTS

Use of Insecticides

Beneficial insects are killed by some of the same insecticides used on pest insects. Initial applications of insecticides that are non-targeted can lead to secondary outbreaks of other pests that would otherwise be controlled by beneficial insects. Secondary outbreaks can require additional insecticide applications and therefore additional costs. To promote beneficial insect populations, it is necessary to:

- Reduce use of broad-spectrum, non-selective insecticides.
- Use targeted insecticides.

Providing Habitat

Generally, more complex habitats have more beneficial insects because they offer food and shelter. Flowering habitats provide food for pollinators, parasitoids that feed on nectar and pollen, and beneficial predators when insect prey is scarce. Many beneficial insects need relatively undisturbed soil, leaf litter, or standing vegetation to provide shelter during hay cutting and for the winter. Flowering habitats can provide this.

- Provide flowering habitat near alfalfa fields.
- Use diverse varieties of flowers to attract a variety of beneficial insects and provide continuous blooms throughout the growing season.

Purchasing Beneficials

Releasing convergent lady beetles (*Hippodamia convergens*) and parasitic wasps of lygus bugs (*Peristenus digoneutis*) is not recommended. There is little evidence of pest suppression by these commercially available species, as these species are known to move on from fields after being released or fail to survive winter.

SAMPLING AND INSECT IDENTIFICATION

Sampling Methods

The best method of initially sampling for insects is using a sweep net. Using a 15-inch sweep net, walk a straight line through the field making one sweep per step, taking 20 steps. Sweep the top 10 inches or less of the alfalfa canopy. For a 20-acre field, take 5 samples. The samples can be frozen in a bag and then sorted through.

Sampling is most accurate when there is little wind and alfalfa is dry. Different insects will be active at different times of day and points throughout the season. Different insects will also likely be found around field edges, as opposed to the field interior. Sweep fields once per week to monitor for the presence and abundance of economically significant pests.



UW Extension Insect Identification

If you have an insect you are unable to identify, you can bring it to your local University of Wyoming Extension office for identification. If the insect is a pest, also bring an example of the damage caused by the insect. Alternatively, you can send the insect or high-quality photos of the insect directly to the Department of Entomology at the University of Wyoming. There is a \$10 fee for identification of insects of agricultural importance. Management options and recommendations are provided by both UW Extension and the Department of Entomology.

For more information on insect identification, visit:
<http://www.uwyo.edu/entomology/insect-identification/>

ADDITIONAL RESOURCES

Pest Management Options

The High Plains IPM Guide provides the most up-to-date information on integrated pest management for crops in Wyoming, Colorado, Montana, and Western Nebraska. It includes economic thresholds and extensive lists of potential biological, chemical, and cultural control options for the pests listed in this guide.

Find the High Plains IPM Guide online at:
<http://wiki.bugwood.org/HPIPM>

Attracting Beneficials and Native Pollinators

The Xerces Society provides a number of helpful fact sheets relating to pollinator and beneficial insect promotion and conservation online at <http://www.xerces.org/>.

This information is also available as a book: *Farming with Native Beneficial Insects: Ecological Pest Control Solutions*, which is a thorough guide to host plants and land management practices that support beneficial insects. This book can be purchased through the Xerces Society website.



ABOUT THE AUTHORS

Allison Jones was a research technician for the University of Wyoming Department of Plant Sciences during the 2015 field season. She has a B.A. in Philosophy, but is interested in continuing her education in entomology. Allison has published other insect fact sheets through the University of Wyoming and the University of Maine Cooperative Extension.

Makenzie Pellissier is a master's student in the Department of Plant Sciences at the University of Wyoming. She completed her B.S. in environmental science at the University of New Hampshire before coming to UW to study the conservation biological control of alfalfa weevil. She plans on pursuing a career where she can help producers make pest management decisions.

Dr. Randa Jabbour is an assistant professor of agroecology in the University of Wyoming Department of Plant Sciences. She conducts research to learn how to improve pest control in cropping systems, with a current focus on alfalfa insects. Randa teaches classes about agriculture and ecology, and connects students with farmers whenever possible to improve learning. She lives in Laramie with her husband, two kids, and several backyard chickens.

Contact Us:
Randa Jabbour
rjabbour@uwyo.edu
(307) 766-3439

IMAGE SOURCES

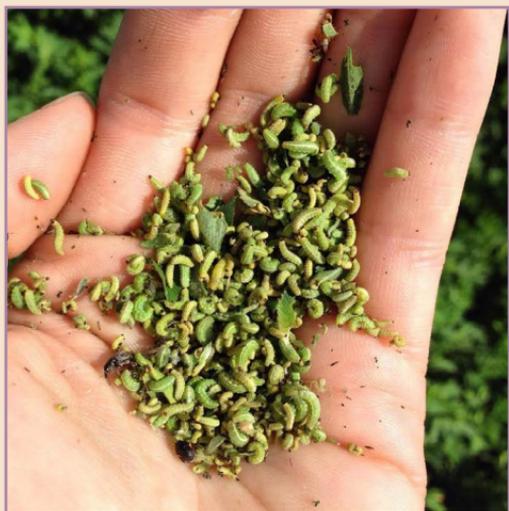
1. *Alfalfa Weevil Larva*, Clemson University - USDA Cooperative Extension Slide Series, Bugwood.org.
2. *Alfalfa Weevil Adult*, Joseph Berger, Bugwood.org.
3. *Clover Root Curculio*, Charles Schurch Lewallen, Bugguide.net.
4. *Clover Root Curculio*, Chris Joll, Bugguide.net.
5. *Palestriped Flea Beetle*, Whitney Cranshaw, Colorado State University, Bugwood.org.
6. *Flea Beetle*, CSIRO [CC BY 3.0 (<http://creativecommons.org/licenses/by/3.0/>)], via Wikimedia Commons.
7. *Two striped grasshopper*, Joseph Berger, Bugwood.org.
8. *Army Cutworm Larva*, Joseph Berger, Bugwood.org.
9. *Army Cutworm Pupa*, Whitney Cranshaw, Colorado State University, Bugwood.org.
10. *Alfalfa Caterpillar*, John Capinera, University of Florida, Bugwood.org.
11. *Alfalfa Butterfly*, “ColiasEurytheme0.{8}\$I \w+|A \w+#by Greg Hume - Own work. Licensed under CC BY-SA 3.0 via Commons <https://commons.wikimedia.org/wiki/File:ColiasEurytheme01.jpg#/media/File:ColiasEurytheme01.jpg>
12. *Pea Aphid*, Andrew Jensen, Bugguide.net.
13. *Spotted Alfalfa Aphid*, Kansas Department of Agriculture Archive, Bugwood.org.
14. *Cowpea Aphid*, Andrew Jensen, Bugguide.net.
15. *Tarnished Plant Bug*, Winston Beck, Iowa State University, Bugwood.org.
16. *Tarnished Plant Bug Nymph*, Scott Bauer, USDA Agricultural Research Service, Bugwood.org
17. *Pale Legume Bug*, Whitney Cranshaw, Colorado State University, Bugwood.org.
18. *Potato Leafhopper*, Steve L. Brown, University of Georgia, Bugwood.org.
19. *Alfalfa Plant Bug*, Bruce Marlin - Own work http://www.cirrusimage.com/bugs_plant_Alfalfa.htm. Licensed under CC BY-SA 3.0 via Wikimedia Commons - https://commons.wikimedia.org/wiki/File:Adelphocoris_lineolatus_JPG#/media/File:Adelphocoris_lineolatus_JPG.
20. *Alfalfa Plant Bug Nymph*, Scott Bauer, USDA Agricultural Research Service, Bugwood.org.
21. *Blister Beetle*, Kansas Department of Agriculture Archive, Bugwood.org.
22. *Braconid Wasp Attacking Lygus Bug Nymphs*, Scott Bauer, USDA Agricultural Research Service, Bugwood.org.
23. *Minute Pirate Bug*, Jack Dykinga, United States Department of Agriculture.
24. *Big Eyed Bug*, Russ Ottens, University of Georgia, Bugwood.org.
25. *Damsel Bug*, Graham Montgomery, Bugguide.net.
26. *Damsel Bug Nymph*, Scott Bauer, USDA Agricultural Research Service, Bugwood.org.

27. *Lady Beetle*, Susan A. Beebe, Bugguide.net.
28. *Lady Beetle Larva*, Dan Leeder, Bugguide.net
29. *Ground Beetle*, “Futureman119.{8}\$I \w+|A \w+#CC BY-SA 3..{8}\$I \w+|A \w+#via Wikimedia Commons https://commons.wikimedia.org/wiki/File:Harpalus_affinis.jpg.
30. *Tiger Beetle*, David Cappaert, Michigan State University, Bugwood.org.
31. *Blister Beetles and Soldier Beetles*, Whitney Cranshaw, Colorado State University, Bugwood.org
32. *Colorado Plains Soldier Beetle*, Kansas Department of Agriculture Archive, Bugwood.org
33. *Syrphid Fly*, Steven Katovich, USDA Forest Service, Bugwood.org.
34. *Syrphid Fly*, David Cappaert, Michigan State University, Bugwood.org.
35. *Syrphid Fly Larva*, David Cappaert, Michigan State University, Bugwood.org.
36. *Green Lacewing*, Jessica Louque, Smithers Viscient, Bugwood.org.
37. *Green Lacewing Larva*, Bradley Higbee, Paramount Farming, Bugwood.org.
38. *Green Lacewing Eggs*, David Cappaert, Michigan State University, Bugwood.org.
39. *Long Jawed Orb Weaver*, Scott Bauer, USDA Agricultural Research Service, Bugwood.org.
40. *Crab Spider*, Whitney Cranshaw, Colorado State University, Bugwood.org.
41. *Hunt Bumble Bee*, Joseph Berger, Bugwood.org.
42. *Alfalfa Leafcutter Bee*, Peggy Greb, United States Department of Agriculture
41. *Sweat Bee*, David Cappaert, Michigan State University, Bugwood.org.
42. *Western Sallowtail Butterfly*, William M. Ciesla, Forest Health Management International, Bugwood.org.

REFERENCES

- Calvin D, Hower A. Potato leafhopper in alfalfa. <http://ento.psu.edu/extension/factsheets/potato-leafhopper-alfalfa>
- Gardiner MM. Good garden bugs. (2015) Quarry Books. Beverly, MA.
- Glozota P. The armyworm and the army cutworm. <https://www.ag.ndsu.edu/extension/entomology/field-crops-insect-pests/Documents/barley/e830-the-army-worm-and-the-army-cutworm>
- Godfrey, LD, Natwick ET, Goodell PB, Long RF. Alfalfa: alfalfa caterpillar. <http://www.ipm.ucdavis.edu/PMG/r1300611.html>
- Godfrey, LD, Natwick ET, Goodell PB, Long RF. Alfalfa: blister beetles. <http://www.ipm.ucdavis.edu/PMG/r1301911.html?printpage>
- Lackman S. Army cutworm –economic thresholds and control. <http://www.co.yellowstone.mt.gov/extension/ag/pubs/ArmyCutworm.pdf>
- Lee-Mader E, Hopwood J, Morandin L, Vaughan M, Black HS. Farming with Native Beneficial Insects: Ecological Pest Control Solutions (2014) Story Publishing. North Adams, MA
- Mahr S. Damsel Bugs. <http://www.entomology.wisc.edu/mbcn/kyf402.html>
- O'Neill R, O'Neill K, Wanner K. Montana Alfalfa Seed Management Pocket Guide. (2014) Montana State University Extension
- Rice ME. First-cutting alfalfa insects. <http://www.ipm.iastate.edu/ipm/icm/2006/5-22/alfalfainsects.html>
- Salisbury SE. Alfalfa Insects Overview of Cutworms, Alfalfa Weevil, and Aphids. <http://www.extension.uidaho.edu/forage/Proceedings/2004%20Proceedings%20pdf/Insect%20pests%20in%20A0.pdf>
- Schell SP, Latchinsky AV, Shambaugh BA. Common wyoming pest grasshoppers. <http://www.wyomingextension.org/agpubs/pubs/B1161.pdf>
- University of Wyoming Berry Biodiversity Center Laramie Area Pollinator Pocket Guide http://www.wyobiodiversity.org/files/5314/3584/9188/Printable_LaramiePollinatorGuide.pdf
- Wenniger EJ, Shewmaker GE. Clover root curculio in alfalfa. <http://www.extension.uidaho.edu/forage/Fact%20Sheets/clover%20root%20curculio.pdf>

Insects in Wyoming Alfalfa is a basic guide to the pests and beneficial insects commonly found in Wyoming alfalfa fields. It includes information on the identification and behaviors of these insects. Also included are important IPM resources for farmers and information about field sampling for insects.



This publication was made possible with funding from the Western Sustainable Agriculture Research and Education Program (westernsare.org) and the the Wyoming Agricultural Experiment Station Competitive Grants Program.

Cover Design: Allison Jones

Cover Illustration: Alfalfa Weevil (*Hypera postica*) by William Stump

Issued in furtherance of extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Glen Whipple, director, University of Wyoming Extension, University of Wyoming, Laramie, Wyoming 82071.

The University is committed to equal opportunity for all persons in all facets of the University's operations. All qualified applicants for employment and educational programs, benefits, and services will be considered without regard to race, color, religion, sex, national origin, disability or protected veteran status or any other characteristic protected by law and University policy.