

BY ERICA STEPHENS
AND RICARDO RAMIREZ

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BENEFICIAL INSECTS & PESTS OF UTAH ALFALFA





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BENEFICIAL INSECTS & PESTS OF UTAH ALFALFA

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ACKNOWLEDGMENTS

Graphic Design by
Olivia Yeip

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Drew Flitton



This publication was funded by a grant from the **Western Sustainable Agriculture Research and Education** program, Project No. GW12-030, <http://wsare.usu.edu>, (435) 797-2257

We graciously thank all the Cache County alfalfa producers who allowed us to explore the insect fauna of their fields. We are particularly grateful for the assistance given by Clark Israelsen for his help in establishing research sites. Much gratitude is extended to the Ramirez Lab (S. Price, A. Lucero, J. Hicken, J. Gonzalez, D. Burnham, J. Larson, A. Fabiszak, L. Frost, and R. Keepers) for help collecting and processing insect samples. We also thank Lori Spears who helped review multiple versions of this guide.

PREFACE

Integrated pest management (IPM) is a multifaceted approach to managing pests by using multiple tactics (e.g., cultural, biological, mechanical, and chemical control) and the judicious use of pesticides to suppress pests. One component of an IPM program is pest monitoring to determine whether (1) pests are present, (2) the susceptible life-stage is present, and (3) pests are reaching economic thresholds requiring treatment. In alfalfa, the primary monitoring tool is a sweep net. A standard sweep net has a 15 inch diameter hoop, canvas bag, and a handle. A sweep net can be used to compare your pest catch to published economic thresholds. Consult with a local county Extension agent on how to obtain and use a sweep net.

Beneficial insects, or predatory insects, play an important role in natural pest suppression in alfalfa. Broad-spectrum insecticide use decreases predatory insects resulting in increased risk of secondary pest outbreaks, especially aphids. Conserve beneficials by not using insecticides when pests are below economic thresholds. Using a sweep net will also help determine which predators are present and whether a field is balanced with predators that help keep pests in check.

USING THIS GUIDE

This publication is an introductory pocket guide to the most abundant arthropods (insects and spiders) found in Utah alfalfa. We provide a brief description of beneficial and pest arthropods including life cycle, brief management considerations for pests, and graphs of their timing and abundance throughout the season. For more details, consult a county Extension agent or the Utah Plant Pest Diagnostic Lab (utahpests.usu.edu).

Graphs result from an alfalfa insect survey conducted during the 2012-2013 growing season in Cache Valley, Utah. Abundance of each insect was calculated from multiple fields that did not use insecticides. The graphs are intended to show only relative differences among species. Keep in mind that differences in yearly temperatures and location can greatly influence timing of insect activity and abundance.



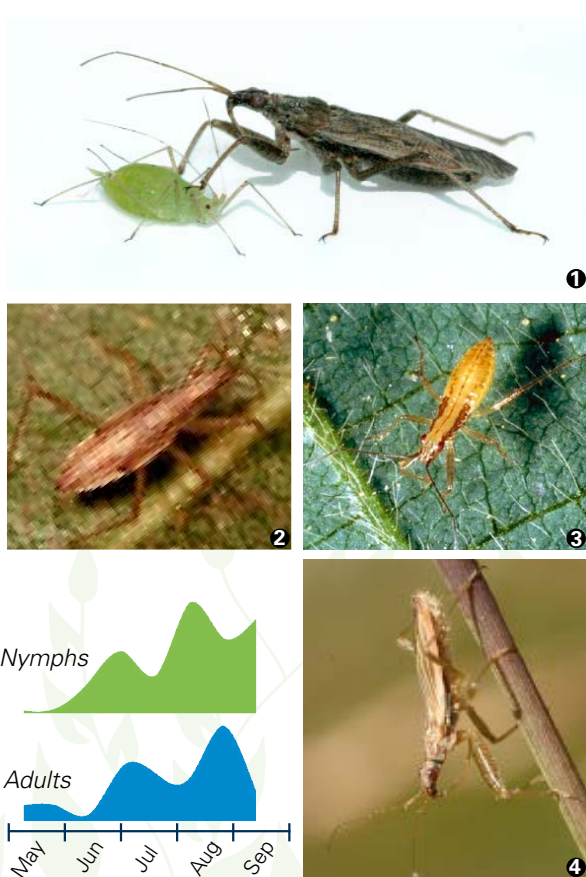
DAMSEL BUGS

Nabis spp.

Appearance: Slender-bodied insects that range in color from grey to golden brown. Raptorial forelegs are used for grasping and holding onto prey, much like a praying mantis. They have piercing-sucking mouthparts which are held underneath the body when at rest, but extend forward to feed. Nymphs are similar in appearance to adults but are smaller in size and have developing wing pads. Adult size is approximately 1/4 inch in length while nymphs are 1/16 to 1/4 inch long.

Biology: Damsel bugs are one of the most abundant beneficial insects in alfalfa, but are difficult to spot due to their coloration and slender form. Their presence and abundance is best determined with a sweep net. Damsel bugs can be sit-and-wait or active foragers that pierce prey with needle-like mouthparts and remove inner contents. Damsel bugs prey on insect eggs, aphids, caterpillars, and other small arthropods.

Life Cycle: Egg - Nymph (5 stages) - Adult. Overwintering adults migrate into fields in early May and deposit eggs inside alfalfa stems.



Damsel bug adults (1, 4) and nymphs (2, 3) consume a wide variety of insects, including pea aphids (1). The wing pads get larger as nymphs develop (2, 3).

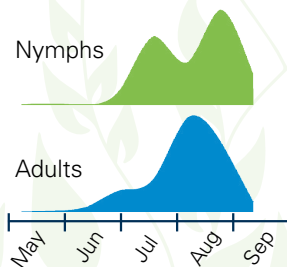
BIG EYED BUGS

Geocoris spp.

Appearance: Small, squat-bodied insects with bulging eyes. Big eyed bugs can be black, brown, or light-tan in color. Segmented antennae are held prominently forward. They have piercing-sucking mouthparts which are held underneath the body when at rest, but extend forward to feed. Nymphs are smaller in size and lack fully developed wings. Adult size is approximately 1/8 inch in length and nymphs are <1/32 to 1/8 inch long.

Biology: Even though adults possess wings, their preferred method of locomotion is walking or running. These fast-moving insects are most frequently found scurrying along the ground. Big eyed bugs actively search for their prey and will feed on plants, seeds, eggs, aphids, larvae, and other small arthropods. Despite some plant feeding habits, they are not considered damaging to plants.

Life Cycle: Egg - Nymph (5 stages) - Adult. Adults will deposit pink, cylindrical eggs on dead leaves, twigs, or within soil crevices. Big eyed bugs overwinter as adults or eggs.



Big eyed bug adults have wings that criss-cross when folded against the back and appear half leathery and half membranous (1, 2). Nymphs have exposed abdomens as wings develop (3, 4).

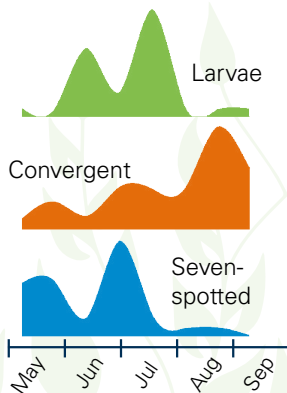
LADY BEETLES

Coccinellidae

Appearance: The most abundant species in Utah alfalfa are the convergent lady beetle and the seven-spotted lady beetle. Convergent lady beetles have variable spot number (0 - 13) and are recognized for their distinct “converging” white lines on their pronotum (section between head and wings). Seven-spotted lady beetles are more circular in shape and will always have seven spots. Larvae of both species are soft-bodied, mostly black with orange markings, and have an “alligator-like” appearance. Eggs are bright yellow, football-shaped, and laid in clusters. Pupae are red to orange with spots and are affixed to surfaces at their base. Adults are 1/4 inch long. Larvae are 1/8 to 3/8 inch long.

Biology: Lady beetles are attracted to the honeydew excretions produced by aphids. Both adults and larvae will voraciously consume these pests. Lady beetles can defend themselves by exuding a yellow toxin through the joints of their exoskeleton in a process known as “reflex bleeding.”

Life Cycle: Egg - Larva (4 stages) - Pupa - Adult. Lady beetles overwinter as adults in large aggregations in sheltered mountain sites.



Seven spotted lady beetle (1) and convergent lady beetle (4) adults feed on a variety of prey. Larvae (3) are also important predators and will attach to various surfaces to pupate (2).

PARASITOIDS

Appearance: Parasitoid wasps are common in alfalfa. They are generally smaller than the host they attack, have a narrow waist, and prominent antennae. These wasps have a modified stinger used to deposit eggs.

Biology: A parasitoid is an organism that lives in or on its prey (host) for part of its life cycle. Unlike a parasite, a parasitoid will eventually kill its host. Adult female wasps will lay an egg in or on the host and the larval stage will feed on the host until pupating. Adult parasitoids are free living and eat pollen and nectar. Parasitoids are specialists and attack specific groups or species of insects. In alfalfa, there are aphid parasitoids and alfalfa weevil parasitoids. Parasitized aphids take on a swollen, cream colored, husk-like appearance called an aphid "mummy." Parasitized alfalfa weevil larvae are killed once they begin to pupate. A parasitoid larva will exit the dead weevil and spin its own cocoon nearby.

Life Cycle: Adults deposit egg(s) onto or inside host – larva(e) develop inside host – pupation inside or outside of host – adult emergence. Parasitoid wasps overwinter in the larval stage.



Adult wasps (1, 2, 3, 5) will inject eggs into their host with their ovipositor (2). Aphid "mummies" (5) and cocoons (3) contain developing wasp larvae. An exit hole is present when an adult wasp has emerged (4).

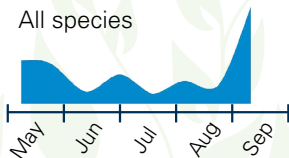
PREDATORY GROUND BEETLES

Carabidae

Appearance: Body shapes and sizes can vary within this diverse group of beetles. Most are generally dark in color (black to red) and sometimes shiny. Most have prominent mandibles, long antennae, and long legs. Adults can range in size from 1/4 to 1 1/4 inch long.

Biology: In general, these predaceous beetles are nocturnal and prefer to hunt along the ground in sheltered areas, but can sometimes be found in the canopy of plants looking for prey. Larvae are also predatory and primarily ground-dwelling. Predatory ground beetles will eat a wide range of prey items including aphids, caterpillars, grubs, mites, and spiders. They are voracious eaters, and can consume close to their body weight in food daily.

Life Cycle: Egg - Larva - Pupa - Adult. Predatory ground beetles can overwinter as adults or larvae.



Ground beetle adults (1, 2, 3) and larvae (4) are generally soil dwelling.

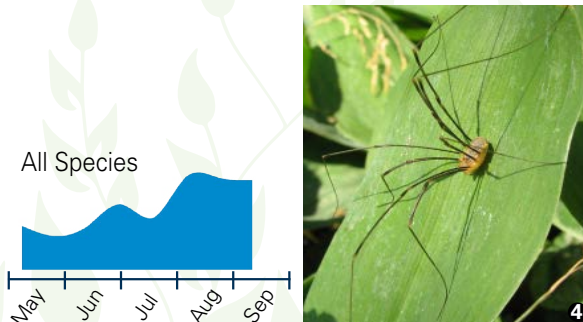
SPIDERS AND DADDY-LONGLEGS

Arachnids

Appearance: Unlike insects, spiders have only two body segments, the cephalothorax (fused head and thorax) and abdomen. They also possess silk glands used for silk production, eight legs, and a pair of chelicerae which are used to inject venom into prey.

Biology: Alfalfa provides habitat for numerous species of spiders. Spiders can be categorized based on their foraging styles such as trapping or web-building (orb-weavers), ambushing (crab spiders), and active hunting (wolf spiders and jumping spiders). Spiders are generalists and will prey on a variety of arthropods. They play an important role in overall pest suppression in alfalfa.

Daddy-longlegs (Opiliones) are commonly mistaken for spiders. Daddy-longlegs belong to a separate group of arachnids which are more closely related to scorpions than they are to spiders. Unlike spiders, daddy-longlegs only have one body section, do not possess venom or silk glands, and cannot produce webs. They are omnivorous and will feed on fungi, decaying matter, and small arthropods such as springtails, mites, and aphids.



Jumping spiders (1), crab spiders (2), and wolf spiders (3) are important predators in alfalfa. Wolf spiders carry their egg sacs attached to their spinnerets (3). A single, fused body section is characteristic of a daddy-longleg (4).



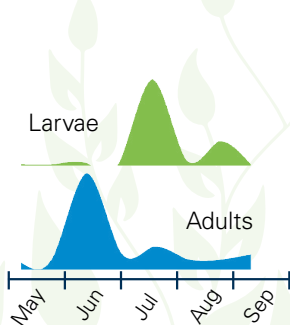
HOVER FLIES

Syrphidae

Appearance: Hover flies have bright yellow and black markings which can make them easy to mistake for bees or wasps. To distinguish between the two, flies will have stubby antenna and only one pair of wings (bees and wasps have two pairs of wings). Hover flies also have large eyes which tend to take up much of the head. Hover fly larvae are slug-like in appearance and vary in color from brown to green to yellow. Some larvae have a pale yellow dorsal stripe, which can make them superficially similar in appearance to alfalfa weevil larvae. Adult flies are about 1/2 inch in length while larvae can be between 1/16 - 1/2 inch long.

Biology: Adult flies will feed on honeydew (aphid excrement), pollen and nectar. They are important pollinators of flowers. Larvae, on the other hand, are effective predators of aphids. Prey are grasped with mouth hooks while the inner contents are removed. Females lay eggs near aphid colonies to ensure an adequate food source for their young.

Life Cycle: Egg - Larva (3 stages) - Pupa - Adult. Hover flies overwinter as adults or larvae.



Adult hover flies feed on pollen and nectar (1). Although they look like bees and wasps, they have a single pair of wings (2) and cannot sting. Predatory larvae (3,4) will consume a variety of soft-bodied insects.

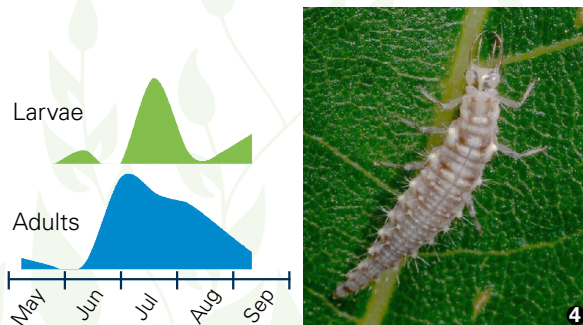
LACEWINGS

Chrysopidae; Hemerobiidae

Appearance: Adults have transparent, delicately veined wings held roof-like over their bodies. Green lacewings are more common than brown lacewings. They have long, slender antenna and protruding eyes. Larvae are mottled brown with a pair of prominent, sickle-shaped jaws. Green lacewing adults are 3/8 inch long and larvae range in size from 1/16 -1/2 inch long.

Biology: Adults will feed on pollen, nectar, and honeydew. Larvae, however, will voraciously consume a variety of soft-bodied insects, especially aphids. Hooked and hollow jaws are used to pierce prey, inject paralyzing venom, and suck up body contents. Larvae will sometimes attach debris to themselves for camouflage against predators and prey. Females will lay eggs in clusters with each egg perched upon a slender stalk.

Life Cycle: Egg - Larva (3 stages) - Pupa - Adult. Lacewings can overwinter in their last larval stage in a cocoon or as an adult.



Green lacewing adults primarily feed on pollen and nectar (1). Lacewing larvae possess prominent, sickle shaped jaws that are used to consume prey (2, 4). Lacewing eggs are laid on stalks (3).

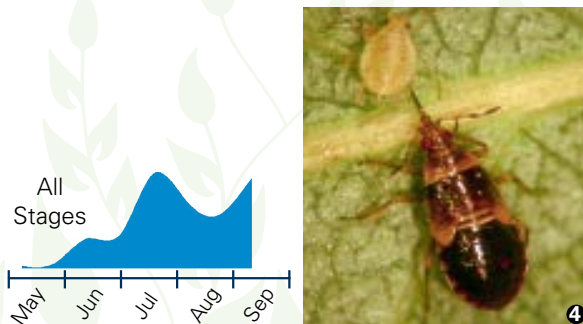
MINUTE PIRATE BUGS

Anthocoridae

Appearance: These tiny insects have a flattened body that is oval to triangular in shape. Adults have a distinct black and white pattern on their wings, while nymphs can appear red to orange in color. Adults are approximately 1/16 to 1/8 inch in length.

Biology: Despite their small size, these insects are important consumers of arthropod eggs, mites, aphids, thrips and other small pests. Their piercing-sucking mouthparts are used to suck up prey contents.

Life Cycle: Egg - Nymph (5 stages) - Adult. Minute pirate bugs overwinter as adults.



Adults (1, 3) and nymphs (2, 4) are important consumers of eggs and small, soft-bodied pests such as aphids and larvae.

ALFALFA WEEVILS

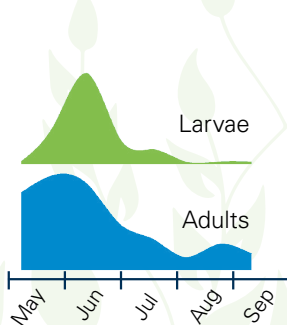
Hypera postica

Appearance: Adults are brown with a darkened, V-shaped marking on their back. They have a pronounced snout. Larvae are green to yellowish-green with dark heads and a pale-yellow to white dorsal stripe. Adults are roughly 1/4 inch long and larva range in size from 1/16 to 5/8 inch long.

Biology: Adults occasionally feed on plants, but rarely cause significant damage. Larvae are the damaging stage. Young larvae may hide within developing leaf whorls, but will feed on exposed leaf surfaces as they get older. The amount of leaf material consumed increases with larval growth.

Life Cycle: Egg - Larva (4 stages) - Pupa - Adult. Alfalfa weevils have one generation per year.

Management: Indoxacarb, pyrethroids, and organophosphate insecticides are the primary treatments when larvae reach economically damaging levels. If larvae are at damaging levels two weeks from harvest, consider an early cut rather than an insecticide treatment and monitor stubble. Insecticides may be needed if regrowth is not seen. Consult county Extension agents to determine economic levels using stem counts and sweep net monitoring.



Alfalfa weevil adult (1) and larvae (2, 4). When larvae are finished feeding, they drop to the soil to pupate in a silk cocoon (3).

CLOVER ROOT CURCULIO

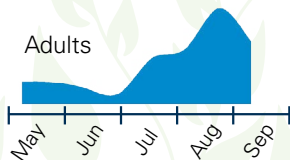
Sitona hispidulus

Appearance: Adults are small, brown weevils, with a slightly checkered appearance. Unlike alfalfa weevils, clover root curculio have a broad snout and are slightly smaller in size. Larvae are white, opaque, and grub-like with reddish-brown heads. Adults are 3/8 inch in length and larvae are 1/4 long when fully grown.

Biology: Adults may chew small, semi-circular holes along leaf margins, although adult feeding is not significantly damaging. Larvae are the most damaging stage and feed on alfalfa roots. Damaged roots can expose plants to plant diseases. Symptoms look similar to nutrient deficiencies, diseases, and may show slow growth and yellowing.

Life Cycle: Egg - Larva - Pupa - Adult. Clover root curculio have one generation per year and overwinter as adults or eggs.

Management: Management is limited in alfalfa because there are no effective insecticides for the susceptible soil-dwelling, larval stages.



Adult clover root curculio (1, 2) and the injurious larval stage with chewing damage to alfalfa tap roots (3,4).

APHIDS

Aphididae

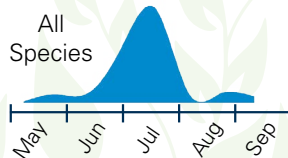
Appearance: Aphids are small, soft-bodied insects that have a pair of backward pointing tubes on the abdomen called cornicles. Some life stages possess wings. Common species include pea aphids (green, long legs and antenna), spotted alfalfa aphids (speckled), and cowpea aphids (black or grey with pale yellow legs and antennae). Aphid sizes range from 1/32 – 1/8 inch.

Biology: Aphids have piercing-sucking mouthparts and feed on plant phloem (nutrient and sugar transport cells). Excess phloem is excreted from aphids in the form of honeydew. Alfalfa can withstand large populations of pea aphids before damage occurs. Spotted alfalfa aphids inject toxins while feeding so low numbers cause significant damage.

Life Cycle: Egg - Nymph - Adult.

Aphids overwinter as eggs. During the summer, they reproduce asexually giving birth to live young, allowing them to multiply very quickly.

Management: Aphid resistant varieties are available. Avoid broad-spectrum insecticides for the control of alfalfa weevil if weevils are below economic threshold. This conserves beneficial insects that keep most aphid problems in check.



Adult and nymph pea aphids (1, 4), spotted alfalfa aphid with nymph (2), and cowpea aphids (3).

BLISTER BEETLES

Meloidae

Appearance: Large-bodied beetles with soft, flexible wings. Wings do not cover the tip of the abdomen. Common species in alfalfa are ash grey or black in color. Adults can be up to an inch long.

Biology: Blister beetles produce cantharidin, a compound which causes blistering upon contact with skin. Beetles crushed in hay can be problematic since this chemical is toxic to livestock when ingested. Beetles are associated with outbreaks of grasshoppers because larvae are predators of grasshopper eggs. Adult beetles have an aggregation behavior and numbers can quickly build up on flowering weeds and alfalfa.

Life Cycle: Egg - Active Larva - Sedentary Larva - Pupa - Adult. Active larvae search for grasshopper egg cases, sedentary larvae feed on eggs.

Management: Weed management is key to reduce flowering plants around fields that beetles are attracted to. Ensure hay is cut before extensive blooming. Although populations can build up in alfalfa, they will migrate after a week or two so wait to harvest. Insecticides are not recommended because dead beetles will remain in the hay where toxic compounds persist.



Black blister beetle (1 - 3), ashray blister beetle (4), and spotted blister beetle (5).

CATERPILLARS

Lepidoptera

Appearance: Many caterpillar species eat alfalfa. Armyworms and cutworms (noctuid moth larvae) have smooth bodies and are variable in color with brown, black, yellow, or pale striping. Alfalfa caterpillars (larvae of yellow or white butterflies) have velvety green bodies with a prominent white stripe along each side. Caterpillars range from 1/8 inch to 2 inches long when fully grown.

Biology: Caterpillars damage alfalfa by feeding on leaves or girdling stems. Caterpillar infestations are variable each year and in each location, but are generally considered occasional pests. Most caterpillar populations are kept in check by beneficial insects.

Life Cycle: Egg - Larva - Pupa - Adult. Multiple generations can occur in a single year. Caterpillars may overwinter in the larval or pupal stage and adults can migrate into Utah from warmer winter locations.

Management: If caterpillars reach economic thresholds when approaching harvest, consider an early cut. Insecticides are available but are more effective when caterpillars are small. Maintain predatory insects to keep populations low.



Yellowstriped armyworm (1). Variegated cutworm larva (2) and adult moth stage (3). Orange sulphur butterfly (4) and larval stage, the alfalfa caterpillar (5).

LYGUS BUGS

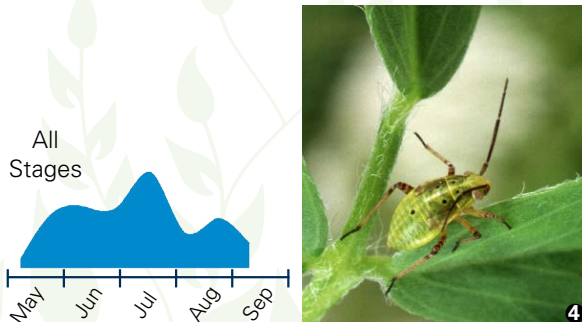
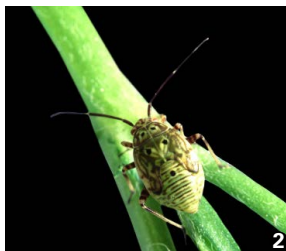
Lygus spp.

Appearance: Coloration is pale green to yellow with brown markings. Adults have a distinctive heart-shaped marking on their back. Young nymphs can be mistaken for pea aphids but lygus nymphs are more mobile and have thicker antennae. Older nymphs have well-defined wing pads. Adult size is about 1/4 inch in length while nymphs are 1/16 - 1/8 inch long.

Biology: Lygus bugs have piercing-sucking mouthparts and feed on buds, flowers, and pods. They inject saliva into plant tissues which cause severe plant damage. Lygus bugs are primarily a pest in alfalfa seed production.

Life Cycle: Egg - Nymph (5 stages) - Adult. There are multiple generations per year (2-3). Lygus bugs will overwinter in the adult stage.

Management: In seed production fields, monitor lygus bugs with a sweep net prior to bloom and periodically throughout seed maturity. Insecticides are the primary tactic for management but should be used when lygus are at economic threshold. Be mindful of pollinators when considering treatments.



Adult lygus bugs (1,3) and nymphs (2,4).

GRASSHOPPERS

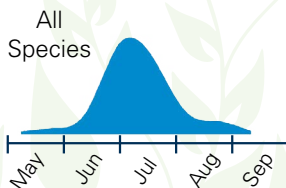
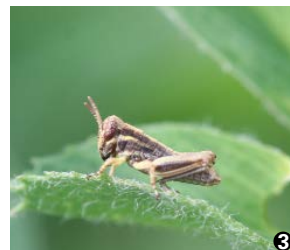
Acrididae

Appearance: Grasshoppers have enlarged hind legs for jumping and are variable in color and size. Nymphs are visually similar, but smaller and without fully developed wings. Adults can be 1- 2 inches long while nymphs can be 1/4 – 1 3/4 inch long depending on the species.

Biology: Grasshoppers will feed on any aboveground foliage. Populations fluctuate each year where weather conditions can influence the severity of grasshopper outbreaks. Drought conditions in rangeland can drive grasshoppers to maintained agricultural crops. Alternatively, cool and wet springs can increase pathogen infection of grasshoppers and decrease their populations.

Life Cycle: Egg - Nymph (5 stages) - Adult. Most grasshoppers have one generation per year. Eggs are laid in the soil during summer and fall.

Management: Area-wide grasshopper management programs exist through the department of agriculture, particularly in counties with chronic grasshopper populations. Consult a county Extension agent for programs in your area. Insecticide-laced baits and broadcast sprays are the most effective against small nymphs.



Redlegged grasshopper (1), differential grasshopper (2), a grasshopper nymph (3), and the two-striped grasshopper (4).

MINOR PESTS

Hoppers: Includes leafhoppers, treehoppers, planthoppers, and spittlebugs. These insects are commonly present in alfalfa fields but damage is rarely significant.

Flea beetles: The palestribed flea beetle (*Systema blanda*) is the most common in Utah alfalfa. Beetles are small (1/8 inch) and have enlarged hind legs that are used for jumping. Larvae can feed on roots and adults may chew irregular holes in leaves.

False chinch bugs: Small (1/8 inch), slender grey to brown insects frequently found in alfalfa. Control is rarely needed. Don't confuse false chinch bugs with the similar looking predaceous big eyed bug. False chinch bugs will have a more triangular shaped head while big eyed bugs have a broad head with larger eyes.

Thrips: Minute (less than 1/16 inch long), slender-bodied insects. Thrips feed by lacerating plant tissues and sucking up contents. Feeding damage can cause crinkled and deformed leaves.



Three-cornered alfalfa hopper (1), leafhopper (2), palestribed flea beetle (3), false chinch bug (4), and western flower thrips (5).

ADDITIONAL RESOURCES

2014 Alfalfa Insect Management from Kansas State Extension [online]: <http://www.ksre.ksu.edu/bookstore/pubs/mf809.pdf>

2013 Field Crop Scouting Manual from University of Wisconsin Extension [online]: <http://ipcm.wisc.edu/download/pubsPM/UW-IPM-ScoutingManual-web.pdf>

Alfalfa Weevil Fact Sheet from Penn State University [online]: <http://ento.psu.edu/extension/factsheets/alfalfa-weevil>

Pest Management Decision-Making: the Economic-Injury Level Concept from Utah State University [online]: <http://extension.usu.edu/files/publications/publication/economic-injury-level96.pdf>

Natural Enemies Handbook: The Illustrated Guide to Biological Pest Control by Mary Louise Flint and Steve H. Dreistadt. University of California, Division of Agriculture and Natural Resources, No. 3386. Published 1998.

Handbook of Forage and Rangeland Insects by William O. Lamp, Richard Berberet, Leon Higley, and Craig Baird. Entomological Society of America. Published 2007.

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PHOTO CREDITS

Beneficials

Page #5: Damsel Bugs

- Photo #1 Ricardo Ramirez, Utah State University
- Photo #2 Bradley Higbee, Paramount Farming, Bugwood.org³
- Photo #3 Phil Sloderbeck, Kansas State University, Bugwood.org⁴
- Photo #4 James Lindsey at Ecology of Commanster via Wikimedia Commons^{1,2}

Page #7: Big Eyed Bugs

- Photo #1 Bradley Higbee, Paramount Farming, Bugwood.org³
- Photo #2 Russ Ottens, University of Georgia, Bugwood.org³
- Photo #3 Whitney Cranshaw, Colorado State University, Bugwood.org³
- Photo #4 Bradley Higbee, Paramount Farming, Bugwood.org³

Page #9: Lady Beetles

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Pests**Page #23: Alfalfa Weevils**

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