



Common Insect and Mite Pests of Small Grains

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Many insects feed on small grains but most do not cause significant damage. Major pest outbreaks are infrequent, but in any given year, some fields will require an insecticide application in order to control a pest outbreak. During severe outbreak years, insecticides may be applied to millions of acres. The decision to apply an insecticide for control of a pest is important because of the narrow profit margins in small grains and continued concern about pesticide misuse in the environment. Therefore, they should be used only when necessary. The use of a well designed Integrated Pest Management (IPM) program can greatly aid in making economically and environmentally responsible decisions on the use of pesticides.

Field scouting, or pest monitoring is a cornerstone of any effective IPM program, and begins with correct identification of the pest. Crop pests can be identified through a combination of direct recognition, knowing something about the biology and habits of the pest, and recognizing injury symptoms on the plant. Scouting does not have to be time consuming, but should provide enough information to make an economically sensible decision.

IPM programs should be based on solid research-based information, be flexible in practice, and include a suitable combination of biological, cultural and mechanical control methods. As a rule, pesticides should be used as a corrective tool that targets a specific pest present in economically damaging numbers. The following information is intended as a guide for identifying, scouting, and managing small grain insect and mite pests in Oklahoma.

Aphids

Greenbug	(<i>Schizaphis graminum</i>)
Russian Wheat Aphid	(<i>Diuraphis noxia</i>)
Bird cherry-oat aphid	(<i>Rhopalosiphum padi</i>)
Rice root aphid	(<i>Rhopalosiphum rufiabdominalis</i>)
Corn leaf aphid	(<i>Rhopalosiphum maidis</i>)
English grain aphid	(<i>Sitobion avenae</i>)

Aphids (Plate 1) can be found on wheat virtually from emergence to harvest. They feed by inserting their needlelike mouthparts into the plant and sucking plant juices. The greenbug and Russian wheat aphid both inject saliva that contains plant toxins. The bird-cherry oat aphid does not have toxins in its saliva, but causes yield loss and it is a primary vector of the virus that causes Barley Yellow Dwarf disease.

The **greenbug** is a soft-bodied, lime-green colored insect with a darker green stripe on its back. The outer half of its antennae and legs are black as well as the tips of its cornicles (cornicles are twin projections that resemble exhaust pipes, and are located on the upper rear of the insect).

The **Russian wheat aphid** is a relatively new arrival to Oklahoma, and occurs primarily in far-western Oklahoma and

the Panhandle. An adult Russian wheat aphid is about 1/16 inch long, pale green in color with a waxy appearance and "spindle shaped." It has short antennae but no prominent cornicles; a projection above the "tail" gives it a "double tail" appearance. This aphid overwinters in the southern part of the wheat belt, and migrates northward each year. It is primarily a pest of wheat and barley, and will most likely be found during the spring.

The **bird cherry-oat aphid** occurs in the fall and spring. Wingless bird cherry-oat aphids are distinguished from the greenbug by their olive-green color and a red-orange patch surrounding the base of each cornicle. "Old" aphids found in winter and early spring may have totally black bodies, but they will give birth to more typical aphids in the spring. Bird cherry-oat aphid is a very efficient vector of the virus that causes Barley Yellow Dwarf (BYD) disease. A close relative, the **rice root aphid**, is often found feeding on the crown roots of young wheat seedlings in early fall and can also cause yield loss and transmit the BYD virus.

The **corn leaf aphid** is bluish-green, with short, black cornicles and black antennae and legs. It is more likely to be found in sorghum or corn, but may occur in seedling wheat in autumn or on mature plants in late spring through summer.

The **English grain aphid** is larger than the greenbug and has a "spidery" appearance because of its long legs and narrow, long cornicles. The body of the English grain aphid is green but both cornicles and legs are completely black. It is commonly found in the heads of wheat, but seldom reduces yield and generally does not require control.

Because aphids can reproduce rapidly, they can seemingly become a problem "overnight." They can disappear just as quickly because they are very susceptible to death from adverse climate or natural enemies. Not all the cereal aphids present in wheat pose a serious threat for yield loss, so it is important to correctly identify the aphid, and accurately assess through sampling, the need for control. For more detailed information on aphid management and sampling in small grains, consult OSU Fact Sheet EPP-7183, Small Grain Aphids in Oklahoma.

Caterpillars

Armyworm	(<i>Pseudaletia unipuncta</i>)
Army Cutworm	(<i>Euxoa auxiliaris</i>)
Fall Armyworm	(<i>Spodoptera frugiperda</i>)
Pale Western Cutworm	(<i>Agrotis orthogonia</i>)

The armyworm is also called the "true armyworm" to distinguish it from the army cutworm and the fall armyworm. The armyworm typically becomes a pest of wheat at heading. It prefers "green" tissue, feeding first on the leaves, then on the beards and finally on the kernels. The most obvious direct damage to wheat is "head clipping," when caterpillars chew completely through

the stem and the head falls off the plant. Head clipping is not a major problem in most years. However, a heavy population may destroy the leaves and/or beards in only a few nights of feeding, and cause indirect yield loss.

Armyworms overwinter as partially grown caterpillars in grass pastures or on grassy weed hosts. Adult moths emerge in early spring (late March and April) and lay eggs in wheat fields. Mature larvae measure 1 1/2 inches long, are smooth bodied, and dark gray to greenish black in color (Plate 2). The most distinguishing feature on this insect is the presence of five stripes extending lengthwise along the body; three on its back, and one on each side.

Armyworms are not easily seen because they hide in the soil during the day and feed on the leaves and heads at night. Heaviest infestations will more likely occur near field margins and in low-lying areas of rank growth or where plants have lodged. Look for this insect in and under debris at the base of plants. The presence of frass (feces) and dropped plant material indicates ongoing feeding activity. When scouting, examine several locations within the field and take an average of worm counts.

Armyworms should be examined closely for size and the presence of small white eggs attached to their "neck," just behind the head capsule. Large armyworms over 1 1/4 inches long are mature. The white eggs are laid by a fly parasite. If most caterpillars are large or many have eggs, treatment is probably not necessary. The treatment threshold is three to four unparasitized armyworms per linear foot of row.

Army cutworm is a sporadic pest of small grains in Oklahoma, but causes widespread losses during outbreak years. Heaviest damage occurs in late winter and spring after temperatures increase. Damaging infestations are more likely to occur during dry years when plant growth conditions are below optimum.

The adult army cutworm moths fly in from mountainous summering grounds in the fall and lays eggs, preferring bare soil. Larvae hatch and feed on new growth in the fall, probably molting once or twice before spring. Larvae overwinter in the soil, and are quite capable of surviving extreme cold weather. Army cutworm larvae have a gray-striped appearance, and will molt seven times before pupating. When disturbed, they exhibit the typical curling into a tight "C" shape (Plate 3). They quit feeding and pupate sometime in April. Adult moths emerge in May, and migrate to the Rocky Mountains to spend the summer, returning to the Great Plains the next fall. One generation occurs each year.

Fields should be checked regularly for this insect, especially during dry winters when the wheat is stressed. Infested fields often seem to "slowly disappear" as army cutworms feed and grow. Fields should be checked by digging or stirring the soil to a depth of two inches and counting cutworms that are exposed. You can focus sampling efforts on "hot spots" in the field, but make sure you have a representative sample of the whole field before making a treatment decision. If army cutworms are found, the treatment threshold is two to three worms per linear foot of row if the wheat is small and water stressed, and four to five if the wheat has adequate water and is growing vigorously.

The **fall armyworm** can be found in wheat from September through frost, and is capable of injuring seedling wheat plants. Mature caterpillars are 1 1/2 inches long and brown, green or black in color and have a prominent inverted white "Y"-shaped line on the front of the head (Plate 4). The eggs are laid at night on grasses or other plants and hatch in a few days. Caterpillars mature in three weeks and there are several generations in Oklahoma each year.

Check for larvae in several locations within the field. Young larvae will not chew completely through a leaf and will leave a "windowpane" like injury. Note any "windowpaning" that occurs as you scout. When scouting, it is important to check the interior of the field as well as the field margins. Frequently, this insect

is numerous along field margins, and a perimeter insecticide treatment may be all that is needed.

Fall armyworms rarely occur in large enough numbers to cause economic injury, but early planted fields are at greatest risk. In seedling wheat, the treatment threshold is two to three larvae per linear foot of row. As plants get older, the treatment threshold is three to four larvae per foot of row if accompanied with evidence of obvious foliage loss.

Pale western cutworm is an occasional pest of wheat in the Oklahoma panhandle. Larvae are shiny, gray to cream-colored, and feed below the soil surface. Their biology is very similar to the army cutworm, but they usually occur two to three weeks later in the growing season. Scout by scratching the soil surface at least two inches deep to look for larvae. The treatment threshold is two or more larvae per linear foot of row.

False Wireworm (*Tenebrionidae*)

False wireworms are a yellow-brown colored, soil-dwelling, hard-shelled, wormlike stage of darkling beetles that feed directly on seeds or newly germinated plants (Plate 5). They tend to cause the most severe injury when seeds are planted into dry soil and do not receive an activating rainfall for several weeks. Because wireworm numbers and damage are often associated with dry conditions, drought is sometimes blamed for stand loss caused by this insect. A number of false wireworm species occur in Oklahoma. Adults are active in late summer, and large numbers of these beetles are a sign that false wireworms may be a problem.

False wireworms can be detected by sifting several one square foot samples of soil to a depth of three inches and searching for the larvae. If two or more larvae are found per square foot of soil, then a registered insecticide seed treatment should be considered.

Hessian Fly (*Mayetiola destructor*)

Hessian fly may occur throughout the eastern and central parts of Oklahoma in limited numbers. The adult female is a tiny, fragile-looking fly measuring less than 1/8 inches. Two generations occur, one in late summer through fall, and another in the spring. This insect overwinters and oversummers as a mature larva in a dark brown puparium called a "flaxseed" (Plate 6). Plants that are injured during the fall will die in the spring, and injury may be mistaken for winterkill. If infestations occur in the spring, stem heads may lodge or break.

Hessian fly can be managed with cultural practices that include:

- Destruction of plant stubble after harvest
- Controlling volunteer wheat
- Resistant varieties
- Planting after the fly-free date in northern Oklahoma.

Mites

Brown Wheat Mite	(<i>Petrobia latens</i>)
Wheat Curl Mite	(<i>Aceria tosichella</i>)
Winter Grain Mite	(<i>Pentthaleus major</i>)

Mites, while not insects, are closely related to spiders and ticks. Three mite species occasionally injure wheat in Oklahoma. The **brown wheat mite** commonly occurs in the western and panhandle counties. Infested wheat plants appear scorched or bronzed and withered. Brown wheat mites are more prevalent during dry weather and injury symptoms can be confused with drought stress. Close examination of the plants and soil will reveal the mites, which are dark brown, have four pairs of light brown to yellow legs, and are about the size of a period on newsprint. The front pair of legs are twice as long as the back pair. Control



Plate 1. Bird-cherry oat aphid.



Plate 2. True armyworm.



Plate 3. Army cutworms.



Plate 4. Fall armyworm.



Plate 5. Wireworms.

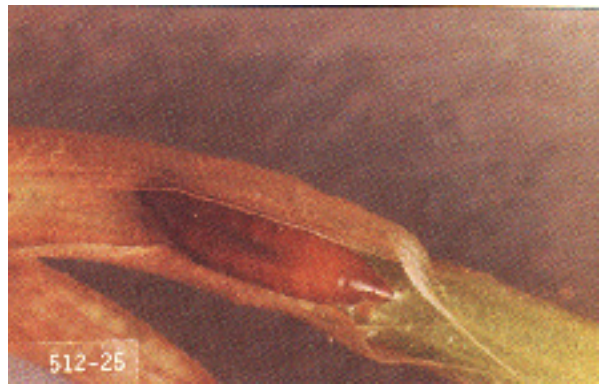


Plate 6. Hessian fly.



Plate 7. Winter grain mite.



Plate 8. White grub.

is sometimes difficult because insecticides suggested for control may be less effective if plants are drought stressed.

The **winter grain mite** is common throughout the state except for the panhandle. It is slightly larger than the brown wheat mite, and has orange-red legs and an orange or red spot on the upper abdomen (Plate 7). This mite thrives under wet, cool conditions and populations decline when temperatures warm. Winter grain mites are more easily seen on plants on cloudy days or in the morning or evening and hide under clods or just beneath the soil crust during daylight hours. Plants may be stunted and infested leaves take on a silvery-gray color when injured and the tips may turn brown. Control is not usually required, but there are effective insecticides available.

The **wheat curl mite** is a whitish colored, sausage-shaped mite measuring about 1/100 inches. They cause the leaves to roll up as they feed, giving the wheat an "onion leaf" appearance. By carefully unrolling the leaves, the mites can be seen with a 10X magnifying lens. This mite transmits a virus that causes wheat streak mosaic disease, and can cause severe problems when infestations are heavy. Unfortunately, chemical control options are not effective. The risk of mite infestation can be greatly reduced by controlling volunteer wheat and planting later in the fall.

White Grub (*Cyclocephala* spp.) (*Phyllophaga* spp.)

White grub is the common name of the larval stage of May or June beetles (Plate 8). They are "C-shaped" with a white body and a tan head. White grubs remain below ground and

feed on wheat roots or other tissues. The most common species of white grubs have a one-year life cycle, but others may have a two- or three-year cycle. Adults are most numerous from May through July. Adult beetles lay eggs singly and prefer high organic matter soils. Larvae hatch in August, and will actively feed until they move below the root zone in response to cooling soil temperatures. They are attracted to fields with weedy vegetation.

Damage to wheat is most likely to occur in the fall to newly established stands. Fields can be checked during seed bed preparation. If three or more grub larvae per square foot are in a field, stand reduction is possible. The best option for control is to delay sowing date until the grubs quit feeding in preparation for overwintering.

Miscellaneous Occasional Pests of Small Grains

There are a number of insects that may rarely damage wheat, including chinch bug and false chinch bug, grasshoppers, and flea beetles. Before control decisions are made, proper identification is necessary. **Current recommendations on control of occasional pests of wheat can be found at your local county Extension office. For current information on chemical control of small grain pests, consult Current Report CR-7194, Management of Insect and Mite Pests in Small Grains, or the current version of E-832, OSU Extension Agent's Handbook of Insect, Plant Disease, and Weed Control.**

Small Grain Insect Activity Calendar

Insect	J	F	M	A	M	J	J	A	S	O	N	D
Armyworm												
Army Cutworm												
Bird Cherry-Oat Aphid												
Brown Wheat Mite												
Chinch Bug												
Corn Leaf Aphid												
English Grain Aphid												
Fall Armyworm												
False Wireworm												
Grasshopper												
Greenbug												
Hessian Fly												
Pale Western Cutworm												
Russian Wheat Aphid												
Wheat Curl Mite												
Winter Grain Mite												
Wireworm												

Light bands indicate presence in field; dark bands indicate critical times when damage is most likely or injury could be prevented.

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