

Cereal Aphids

G. L. Hein, Extension Entomologist, J. A. Kalisch, Extension Technologist, and J. Thomas, Research Coordinator

Identification and general discussion of the cereal aphid species most commonly found in Nebraska small grains, corn, sorghum and millet.

Cereal aphids can be a serious threat to several Nebraska crops. Aphid feeding may cause direct damage to the plant or result in transmission of plant diseases. Aphids also may cause damage by injecting toxic salivary secretions during feeding.

In Nebraska the most serious cereal aphid problems result from Russian wheat aphid infestations on wheat and barley and greenbug infestations on sorghum and to a lesser extent on wheat. Growers must monitor their crops for these aphids. Several other cereal aphid species also may be present, but they seldom cause significant damage. Accurate aphid identification is necessary to make the best management decisions. *Figure 1* illustrates how to identify the major cereal aphids found in Nebraska.

Refer to <http://ianrpubs.unl.edu/insects>, UNL Extension Insect Publications Web site, the <http://entomology.unl.edu>, Department of Entomology Web site, or the <http://highplain-sipm.org> High Plains Integrated Pest Management for more information on managing cereal aphids.

Aphid Biology

Aphids are small (1/16 to 1/8 inch), soft-bodied insects that obtain their nutrition by sucking sap from plants. They have two cornicles that protrude from the upper surface of the abdomen near the tail. These “tailpipes” vary in length and may be reduced to mere bumps in some species (e.g., Russian wheat aphid). During feeding, aphids inject salivary secretions into plant tissues. The salivary secretions of some aphids are toxic and can cause severe tissue damage in the plant. Symptoms of aphid injury include leaf stippling, discoloration or striping. In addition, wilting, premature browning and death of the plants may result.

Plant viruses also can be injected into the plants during aphid feeding. Barley yellow dwarf virus can be transmitted to wheat and barley by the bird-cherry/oat aphid, corn leaf aphid, greenbug, and English grain aphid. The bird-cherry/oat aphid, corn leaf aphid and greenbug also transmit maize dwarf mosaic virus to corn and sorghum in Nebraska. These aphid-vectored diseases usually are not serious in Nebraska; however, in some years they can be significant. Disease can be transmitted whenever a few aphids move in or out of the field rapidly, making their presence difficult to detect.

The primary means of reproduction for the aphid species discussed here is asexual (parthenogenesis), with eggs hatching inside the female aphid and the female giving birth

to living young. A female may produce two to three young per day under warm conditions, and females may mature in 7-10 days. This tremendous reproduction potential can result in rapid aphid population buildup. Males of some species are seldom if ever seen.

Both winged and wingless aphids may be present in the field. Winged forms are produced when the quality of the host plant declines, such as at maturity. Other factors, including temperature, photoperiod or seasonality, and population density also may be involved. The ability of aphids to use flight for dispersal is an important factor that contributes to the status of these insects as pests.

Greenbug, *Schizaphis graminum* (Rondani)

The greenbug is a light green aphid with a dark green stripe down the middle of the back. The tips of the legs and cornicles and most of the antennae are black. Winged forms of the greenbug are darker than the wingless forms. Greenbugs are most often found feeding on the underside of the lower leaves of wheat and sorghum; however, they also may be found in the whorl of seedlings.

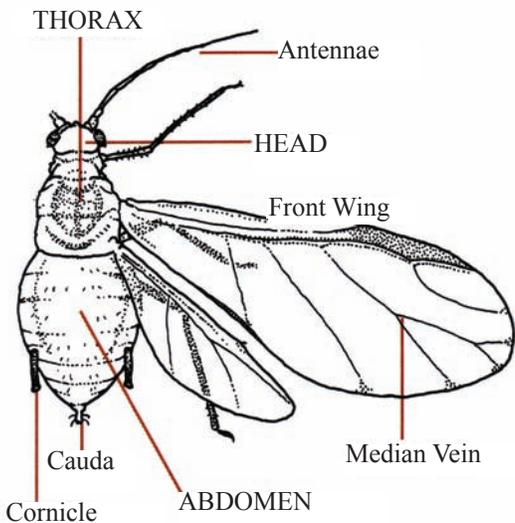
Greenbugs are the most important insect pest of sorghum in Nebraska. They seldom overwinter north of southern Kansas, where they can be a major pest of winter wheat, especially when mild winters permit reproduction and survival. Infestations in Nebraska originate from winged greenbugs blown northward by spring winds. Greenbugs moving into Nebraska early in the spring infest winter wheat and perhaps other small grains. Later flights from the south, along with offspring from the earlier flights, begin to infest sorghum from late May into June. Damaging levels of greenbugs usually occur in late June and July in sorghum. By August populations usually begin to decline, often as a result of control by natural enemies. Greenbugs only rarely damage Nebraska wheat in the spring, but may occasionally develop damaging populations in the fall.

Unlike some cereal aphids, salivary secretions of the greenbug are toxic to the plant. This destructive toxin kills plant cells and results in yellow discoloration of the leaves with reddish spotting. The reddish discoloration is especially distinct on susceptible sorghum varieties. Effects of damage are loss of stand, reduced vigor, poorly filled heads, light test weight and ultimately reduced yields. The first sign of a greenbug infestation is a circular, yellowish spot in the field. The center plants in these spots have the highest infestations and are the most severely damaged.

Greenbug management in sorghum relies on the use of resistant varieties, conservation of natural enemies and timely insecticide applications. Biotypes that have overcome varietal resistance in sorghum are common. In addition, some

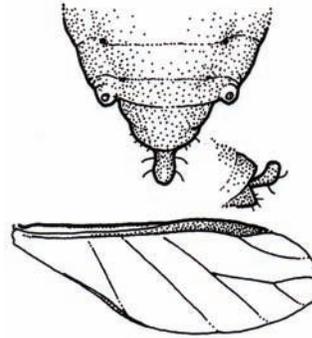
Key to Common Aphids in Nebraska Cereal Crops

Aphid Anatomy



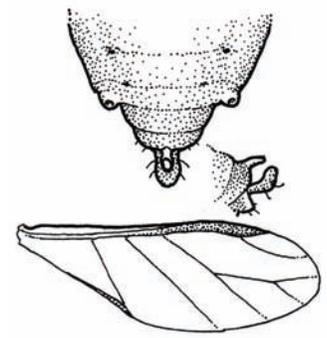
Cornicles much reduced, cone-shaped, not pigmented

Tip of abdomen with single "tail" (only cauda present)



Western Wheat Aphid
(*Diuraphis tritici*)

Tip of abdomen with double "tail" (extra tail above cauda)



Russian Wheat Aphid
(*Diuraphis noxia*)



Wingless Aphids: Body light green, spindle shaped and often heavily powdered; legs, cauda and tips of antennae dusky; cornicles light green reduced and cone-shaped; antennae very short.



Wingless Aphids: Body light green, spindle shaped; all of legs dusky; cornicles light green, reduced and cone-shaped; antennae very short and dark at tips; projection above cauda.



Winged Aphids: Body darker green than wingless form; all of legs and tips of antennae dark; median vein in front wings two-forked.

Artwork and slide images, except for Western Wheat Aphid, by Jim Kalisch, UNL Extension Technologist, Entomology.

Cornicles quite apparent, cylindrical, pigmented.

Only tips of cornicles dark

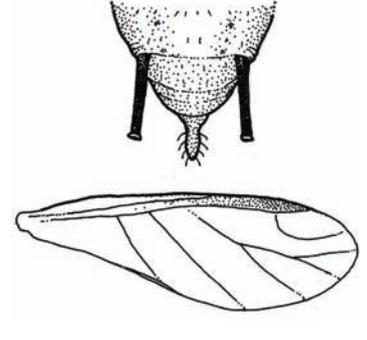
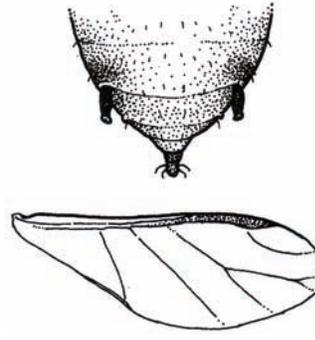
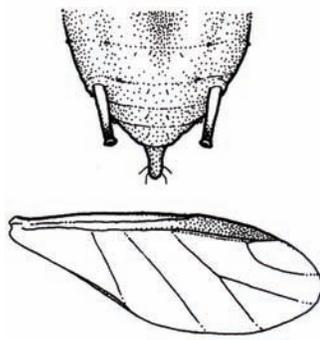
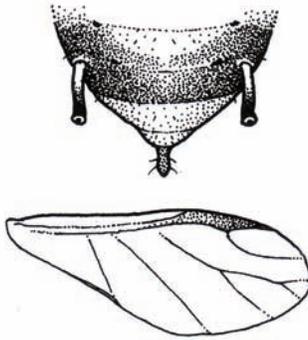
Cornicles completely dark

Reddish-orange spot on back around base of cornicles

Without reddish-orange spot, but with dark green stripe on pale green back

Cornicles short and broad; bases of cornicles often dusky

Cornicles long and narrow



Bird Cherry-oat Aphid
(*Rhopalosiphum padi*)

Greenbug
(*Schizaphis graminum*)

Corn Leaf Aphid
(*Rhopalosiphum maidis*)

English Grain Aphid
(*Sitobion avenae*)



Wingless Aphids: Body olive-green and broadly oval in form with reddish-orange patches around bases of cornicles; tips of leg segments, tips of cornicles and antennae dusky to black.

Wingless Aphids: Body light green to pale yellow-green with darker green stripe down middle of back; tips of legs, tips of cornicles and most of antennae black.

Wingless Aphids: Body green with bluish tinge; head region, legs, cauda, and antennae dusky; cornicles black and dusky at bases; antennae and cornicles short.

Wingless Aphids: Body bright green, large and broadly spindle-shaped, often shiny; legs, antennae and cornicles long; leg segments black toward ends; antennae and cornicles completely black.



Winged Aphids: Body dark green and black; legs dusky with tips of segments black, antennae black; median vein in front wings two-forked.

Winged Aphids: Body green and olive-tan with darker green stripe down middle of back; tips of legs and cornicles black; antennae mostly black; median vein in wings one-forked.

Winged Aphids: Body dark green and black; legs, cornicles, cauda and antennae black; antennae short; median vein in front wings two-forked.

Winged Aphids: Body green with head thorax, antennae, cauda, cornicles and legs black; cornicles and antennae long; median vein in front wings two-forked.

greenbug populations also have been found to be resistant to certain organophosphate insecticides. These factors have complicated greenbug management. Scouting to detect the presence of these insects and adherence to thresholds is essential to management.

Russian Wheat Aphid, *Diuraphis noxia* (Mordw.)

The Russian wheat aphid is a small aphid with a greenish, spindle-shaped body and short antennae. Its cornicles are very short, and when viewed from the side, it has a double-tailed appearance because of a projection arising above the cauda. Damage from the Russian wheat aphid ranges from yellow or whitish streaking to purpling of the damaged leaves. The aphid feeds within the whorl of the upper leaves, causing the leaf to remain tightly rolled. Subsequent leaves may be trapped by these tightly rolled leaves. As the plant grows, Russian wheat aphids continue to move to the whorl and feed on the youngest leaves. Enclosed within the rolled leaf, Russian wheat aphids are inaccessible to natural enemies and direct contact from insecticides. Severely damaged plants appear stunted and stressed, and tillers may become prostrate. Rolled leaves at the time of head emergence result in curved or “fishhook” heads due to the awns being trapped in the curled leaf. The most serious yield losses result from damage to the flag leaf and incomplete seed set on the curved heads. Heavy infestations during heading can result in severe test weight reductions. The Russian wheat aphid has not been found to transmit any viral diseases.

Russian wheat aphid has become the most serious insect pest of wheat and barley in the arid areas west of the 100th meridian. Infestations begin in the fall when Russian wheat aphids move out of alternate grass hosts (several grasses and volunteer wheat) and into the newly emerging wheat. Severe fall infestations leave plants weakened and more vulnerable to winter kill. Infestations that result from overwintering Russian wheat aphids are the most severe in Nebraska because populations are able to build up early and cause serious damage in the spring. Late spring movement into Nebraska does not result in severe damage to winter wheat, unless there is little rainfall during the heading stages. During heading, the aphid is very susceptible to being dislodged from the plant, and populations do not build up in the heads if substantial rainfall occurs. Spring barley, however, is at severe risk for damage from aphid movement in the spring because it is infested at a much younger stage.

Since the mid-1990s, management of the Russian wheat aphid has relied on resistant varieties. Several winter wheat varieties resistant to the Russian wheat aphid were released from Colorado State University; all carried the Dn4 gene (e.g. Halt, Prowers 99, Prairie Red, Ankor, and Yumar). Beginning in 2002, a new biotype of the Russian wheat aphid was identified with the ability to overcome the resistance in the Dn4 varieties. This new biotype has been named “biotype 2” and has been shown to have a widespread presence in western Nebraska along with the original “biotype 1” aphid. Additional biotypes are thought to occur in other areas.

The current resistant varieties still provide some value in reducing risk, but management of the Russian wheat aphid also must rely on cultural practices. Controlling volunteer wheat, avoiding early planting of winter wheat, planting

spring barley as early as possible and maintaining a healthy crop will help minimize the risks from the Russian wheat aphid. Monitoring aphid populations in the fall and spring and following treatment guidelines are necessary to minimize the risk of serious losses.

Corn Leaf Aphid, *Rhopalosiphum maidis* (Fitch)

The wingless form of the corn leaf aphid is bluish green with black legs, antennae and cornicles. The winged forms have a darker body and appear nearly black. The corn leaf aphid can be found on corn, sorghum, wheat and barley in Nebraska. It is not considered an important pest on any of these crops. Its spring movement to the north seems to lag behind both the greenbug and the English grain aphid. It can be found on wheat late in the spring, and it moves to corn and sorghum after wheat heading. It generally feeds in the whorl of the plant, and numbers decline after heading or tassel emergence. Extremely heavy infestations on corn may foul the tassel with sticky honeydew and interfere with pollination.

Bird-Cherry/Oat Aphid, *Rhopalosiphum padi* (L.)

Wingless aphids are olive green with a reddish-orange area at the base of the cornicles. The tips of its legs, cornicles and antennae are black. The winged form of this aphid is also darker than the wingless form. This aphid occurs on several grasses, including wheat and certain wild grass species. Colonies are often found on the underside of leaves or on leaf sheaths and heads. It is present on wheat in the spring (April-June) and in the fall. Its status as a pest is uncertain, but it seldom causes serious problems.

English Grain Aphid, *Sitobion avenae* (Fab.)

The English grain aphid is bright green, larger than other cereal aphids, and has long black legs, antennae and cornicles. It can be found feeding on most small grains, corn and several grasses. Its movement north in the spring coincides with that of the greenbug. Colonies will be present on the leaves before heading, and it is more likely than the other cereal aphids to continue feeding in the bracts and reproduce during heading. The English grain aphid is only of concern on small grains where heavy infestations at the time of flowering may result in lowered test weight.

Western Wheat Aphid *Diuraphis tritici* (Gillette)

The western wheat aphid is not of economic concern in Nebraska; however, it is important because of its similarity to the Russian wheat aphid. It is distinguished from the Russian wheat aphid by its lack of the projection above the cauda giving it a single-tailed rather than a double-tailed appearance when viewed from the side. In general, it is found only in areas of highest elevation in western Nebraska.

UNL Extension publications are available online at <http://extension.unl.edu/publications>.

**File under: INSECTS & PESTS
C-40, Field Crops**

1996, Revised August 2005

Extension is a Division of the Institute of Agriculture and Natural Resources at the University of Nebraska–Lincoln cooperating with the Counties and the United States Department of Agriculture.

University of Nebraska–Lincoln Extension educational programs abide with the nondiscrimination policies of the University of Nebraska–Lincoln and the United States Department of Agriculture.

© 1996-2005, The Board of Regents of the University of Nebraska on behalf of the University of Nebraska–Lincoln Extension. All rights reserved.