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# Aphids Infesting Idaho Grain and Corn

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Several species of aphids infest Idaho cereal crops above and below ground. Some can be serious pests. Effective pest management often depends on knowing which aphids are infesting the crop. This publication will help readers accurately identify aphids infesting cereals and corn.

## Damage

Depending on the species, aphids can damage cereal crops by direct feeding, injection of toxins, virus transmission or any combination of the three. The English grain aphid *Sitobion avenae* (Fabricius), causes direct loss by feeding in large numbers on the heads of spring sown wheat. It also can transmit barley yellow dwarf virus (BYDV). Greenbugs, *Schizaphis graminum* (Rondani), cause injury by injecting toxic saliva. They can transmit BYDV, and, when present in large numbers, they also cause direct feeding damage.

## Life History

Except for one generation of males and egg-laying females produced in the fall by most species, all aphids are females which give birth to active young. These live-bearing females can reproduce quickly. An adult can produce 20 to 30 nymphs in a few days. Under optimum conditions, a nymph will mature and begin producing young in less than a week.

Some grain-infesting aphids live only on grains and grasses. Others, called host-alternating species, overwinter on woody plants and feed on grains and grasses in the summer. Those that do not live on alternate hosts may overwinter either as eggs (English grain aphids and greenbugs) or as summer live-bearing forms (corn leaf aphids and possibly other species in protected locations).

In the case of a typical host-alternating species, the aphids overwinter as eggs on certain trees or shrubs. These eggs hatch in the spring, giving rise to stem mothers. Usually one or more wingless generations are produced on the woody hosts. As the colony grows, winged migrants develop and colonize summer hosts such as grains and grasses. Several generations are produced during the summer. Winged forms that can infest new plants develop in crowded colonies.

In the fall, the colonies produce a generation of winged males and females that migrate back to their preferred overwintering hosts. When a suitable shrub is located, the fall migrant females produce wingless, egg-laying females which mate with the males before laying the overwintering eggs.

## Virus Transmission

Many cereal aphids can transmit one or more viruses of the disease complex known as barley yellow dwarf. The seasonal cycle of this disease can be quite complex. The virus passes the winter in winter grain crops, winter annual grasses and perennial grasses. In the spring, several species of aphids carry the virus to spring-sown grain, corn and grasses. In the fall, immigrant aphids carry the virus from their summer reservoirs back to winter cereals to complete the cycle.

Volunteer grain can be an important interim reservoir for aphids and BYDV. Some viruses in the disease complex are transmitted only by one aphid species, and others are transmitted by several species. The potential for an epidemic depends upon the number and species of aphids present, the identity of the virus and the percentage of aphids carrying the virus.

## Control

In some situations, aphid populations may be controlled by natural predators or parasites. In many instances, however, the natural populations develop too late to affect increasing populations of aphids. Therefore, most aphid pests must be controlled with insecticides, applied either at planting or post emergence. For control recommendations, refer to the Current Information Series bulletins on individual species, such as CIS 778 on English grain aphids or the current Pacific Northwest Insect Control Handbook.

Not all aphid species found on cereal crops cause economic damage, so an ability to identify which aphids are present is important. The English grain aphid, for example, causes considerable damage at very low numbers because of its feeding site, whereas higher numbers of rose grass aphids can be tolerated. The pictures in this publication will help identify the aphids present in your crops.

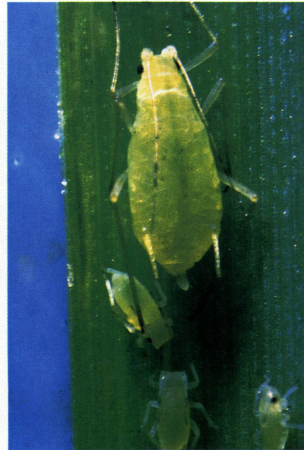
**Plate 1** — The bird cherry oat aphid [*Rhopalosiphum padi* (L.)] host alternates between chokecherry bushes in the winter and a great variety of grain crops and grasses in the summer. Normally, egg-laying forms are produced on the chokecherry bushes, and the insects overwinter as coldhardy eggs; however, in mild winters or under protective snow cover, some may overwinter as summer forms. Bird cherry oat aphids are usually found on the leaves or stems of wheat and barley plants. In the fall, they can sometimes be found below ground. They become particularly abundant on maturing corn, and dense colonies often cover ear sheaths and leaves. They are efficient vectors of barley yellow dwarf virus.



**Plate 2** — Greenbugs [*Schizaphis graminum* (Rondani)] live on a variety of crops and grasses throughout the year. In the summer, they form dense colonies on the upper or lower surfaces of the leaves, often becoming particularly abundant as the grain is heading. As the grain matures, winged forms may be produced in enormous numbers. In the fall, greenbugs are more likely to be found at the bases of plants on newly emerged winter wheat. Greenbug damage is characterized by yellow and brown spots around feeding areas caused by toxins secreted by the insects. Greenbugs probably overwinter as eggs in Idaho and some also may overwinter as summer forms during mild winters and in protected locations. Greenbugs are important vectors of barley yellow dwarf virus, particularly in the high mountain valleys of eastern Idaho where growers often sow fall grain before summer flights have subsided.



**Plate 3** — The rose grass aphid [*Metopolophum dirhodum* (Walker)] alternates between rose bushes in the winter and small grain crops and grasses in the summer. The favorite summer host plants of this species include wheat, barley and canary grass. Peak populations occur on leaves of spring wheat and barley in the milk to soft dough stages. Colonies often form rows along the leaf veins. As the grain matures, large numbers of winged forms are produced. Rose grass aphids can also be abundant in the fall on autumn-sown crops where they can contribute significantly to spread of barley yellow dwarf virus.



**Plate 4** — The corn leaf aphid [*Rhopalosiphum maidis* (Fitch)] does not have an alternate winter host, and its life cycle includes no egg-laying generation. It overwinters exclusively as summer forms in protected locations. This species prefers barley, corn and certain weeds, especially barnyard grass and witch grass. It rarely colonizes wheat in Idaho. These aphids prefer protected locations on the plant, such as leaf whorls or heads and tassels that have not emerged. Peak populations occur in late summer. Corn leaf aphids can transmit barley yellow dwarf virus.



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**Plate 5** — The English grain aphid [*Sitobion avenae* (Fabricius)] does not have an alternate winter host. The aphids live on a variety of small grains, grasses and occasionally on corn. They overwinter as eggs on winter wheat or grasses. Peak populations occur on heads of spring-sown wheat at the soft dough stage. Because these aphids feed directly on the heads of maturing grain, they can cause considerable yield reduction due to reduced number of grains per head or smaller, shriveled kernels. They can also be vectors of barley yellow dwarf virus.

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**Plate 6** — *Diuraphis (Holcaphis) frequens* (Walker) has no common name. This species lives year around on grasses and grains. The overwintering stage is probably eggs, although some summer forms may overwinter in protected locations. These aphids live in leaf whorls and in tightly curled leaves. They are covered with a white waxy substance, making their dense colonies look very messy. Observed damage has been restricted to isolated wheat plants which were severely stunted and distorted. Colonies can most easily be found near the edges of maturing spring-sown wheat fields. *D. frequens* can probably be discounted as a vector of barley yellow dwarf virus. *Diuraphis (Holcaphis) tritici* (Gillette) is similar to *D. frequens* but can be distinguished by its longer, sharper mouthparts. *D. tritici* is probably a native North American species, whereas *D. frequens* is introduced from Europe.



**Plate 9** — The potato aphid [*Macrosiphum euphorbiae* (Thomas)] is only an occasional visitor on small grain, but it can be quite abundant on corn. It is likely to be found near the base of a leaf on the underside. This species overwinters as eggs on rose bushes and has an extremely wide host range in the summer. It may occasionally transmit barley yellow dwarf virus but should not be considered an important vector.



**Plate 7** — The Russian wheat aphid [*Diuraphis (Diuraphis) noxia* (Mordvilko)] is a serious new pest. It was first reported in the United States in the spring of 1986 in southern Texas. During that season its range spread as far as southern Wyoming. It was first found in Idaho in June 1987. This species spends its entire life cycle on a wide host range of grains and grasses. Wheat and barley are particularly favorable host plants. Little is known about how the Russian aphid overwinters. Eggs have been reported in Europe and adults overwintering on roots were reported in South Africa. These aphids prefer to live in leaf whorls and tightly rolled leaves. They severely damage the plants, causing stunting and white and purple streaking of leaves. Because of their tendency to hide in leaf whorls, severe damage can occur before infestations are noticed. Results from experiments concerning their ability to transmit barley yellow dwarf virus have been contradictory.

**Plate 8** — *Sipha elegans* del Guercio is most often found on spring wheat, especially in weedy fields, becoming most abundant as the wheat reaches the milk to soft dough stages. These pretty yellow aphids are frequently found living in greenbug colonies. They prefer wheat as a host, and they overwinter as eggs on wheat or wild grasses. Though toxic to the plant, they rarely become numerous enough to cause economic damage. They may occasionally transmit barley yellow dwarf virus.

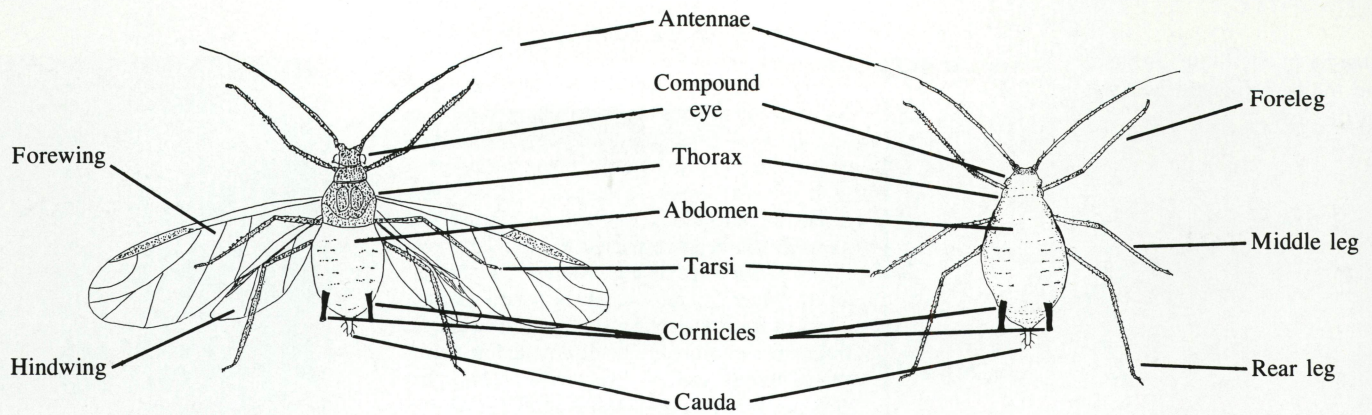


**Plate 10** — The root aphid complex includes several genera about which little is known. Some host-alternating species such as *Tetraneura ulmi* (L.) spend winters on woody plants and summers on grass and grain roots. Others live year around on grasses and grain roots. *Tetraneura* spp., *Forda* spp. and *Rhopalosiphum* spp. are most apt to colonize the crown of the plant. *Geoica* spp. and *Anoecia* spp. are more likely to be found farther underground. *Rhopalosiphum* spp. (including the apple grain aphid (*R. insertum*) and the rice root aphid (*R. rufiabdominalis*) can be efficient vectors of barley yellow dwarf virus (BYDV). The bird cherry oat aphid (*R. padi*), an important vector of BYDV, will sometimes also be found underground, especially on winter wheat and barley during the fall. Other species in the root aphid complex may occasionally transmit BYDV.



*Forda marginata* Koch

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## Key to Aphids Which Could Be Found on Cereals and Corn in Idaho

1. a. Aphids above ground. go to 2  
b. Aphids found on roots (Plate 10). go to 11
2. a. Cornicles obvious, longer than wide. go to 3  
b. Cornicles difficult to see, shorter than wide. go to 8
3. a. Body (particularly of wingless adults) dark grey to black; legs not black (Plate 1). Bird cherry oat aphid (*Rhopalosiphum padi*)  
b. Aphids not dark grey or black; legs variable. go to 4
4. a. Cornicles entirely black. go to 5  
b. Cornicles pale, at most with tip dark. go to 6
5. a. Antennae less than  $\frac{2}{3}$  length of body; cauda short, black; cornicles short, extending no farther than end of abdomen; body "army green," often with dark markings, legs entirely black; often in concealed locations such as leaf whorls and emerging corn tassels; serious pest of barley and corn (Plate 4). Corn leaf aphid (*Rhopalosiphum maidis*)  
b. Antennae at least  $\frac{2}{3}$  as long as body; cauda elongate, white; cornicles of adults longer, extending slightly past the end of the abdomen; adults variously colored: green, yellow, pink, brown or orange; legs not entirely black; often living on heads of maturing grain (Plate 5). English grain aphid (*Sitobion avenae*)
6. a. Cornicles long and extending beyond tip of cauda; large green or occasionally pink aphids on leaves and stalks (Plate 9). Potato aphid (*Macrosiphum euphorbiae*)  
b. Cornicles not extending beyond tip of cauda; other characters variable. go to 7
7. a. Body bright green, often with darker stripe down mid dorsum of abdomen; antennae shorter than body; colonies forming dense clusters on leaves of small grains (Plate 2). Greenbug (*Schizaphis graminum*)  
b. Body pale tan; antennae as long as body; colonies often forming along leaf veins of small grains (Plate 3). Rose grass aphid (*Metopolophium dirhodum*)
8. a. Body oval, bright yellow (hot weather) or green (cool weather) with conspicuous hairs and spots; never waxy; cauda rounded and not obvious; living exposed on wheat leaves (Plate 8). *Sipha elegans*  
b. Body spindle-shaped, greenish without conspicuous hairs or spots; often waxy; cauda short but apparent; hiding in rolled leaves or leaf whorls. go to 9
9. a. Supra-caudal process present on abdominal segment VIII; body obviously green; wax not abundant; toxic to plant, causing white (warm weather) or purple (cool weather) streaking. Russian wheat aphid on leaves (Plate 7). [*Diuraphis (Diuraphis) noxia*]  
b. Lacking supra-caudal process; green color may not be obvious due to abundance of wax; causes severe stunting and leaf-rolling, but not white or purple streaking. go to 10
10. a. Ultimate rostral segment barely twice as long as wide (about 0.07 mm long) (Plate 6). *Diuraphis (Holcaphis) frequens*  
b. Ultimate rostral segment 3 times as long as wide (about 0.12 mm long) (see paragraph on Western Wheat Aphid *D. frequens*). [*Diuraphis (Holcaphis) tritici*]
11. a. Cornicles obvious, dark body. *Rhopalosiphum* spp.\*  
b. Cornicles absent or pore-like. go to 12
12. a. Cornicles pore-like; aphid sometimes rotund (*Tetraneura*). go to 13  
b. Cornicles absent; adult apterae spherical or hemispherical. go to 14
13. a. Tarsi on apterae one-segmented; body often bright orange; cauda prominent; body rotund, not hairy. *Tetraneura* spp.  
b. Tarsi 2-segmented; body dull orange, white or black; cauda not prominent; body hairy, not spherical. *Anoecia* spp.
14. a. Adults and larger nymphs powdery white and inactive; smallest nymphs blue-grey and active. *Geoica* spp.  
b. Adults inactive, off-white to dull orange or army green, but not powdery; smallest nymphs brown and active. *Forda* spp.

\*Includes *R. padi* (bird cherry oat aphid), *R. insertum* (apple grain aphid) and *R. rufiabdominalis* (rice root aphid) which are impossible to separate without using a microscope.