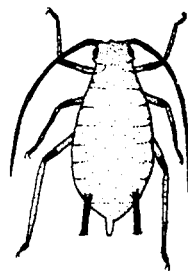


Aphid Management

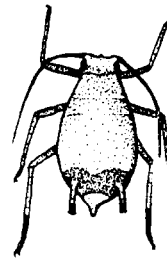
in Small Grains, Corn and Sorghum



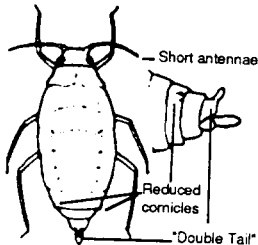
Dean K. McBride and Phillip A. Glogoza
Extension Entomologists



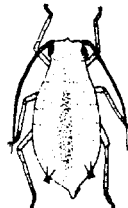
English Grain Aphid
(bright green with
long black cornicles)



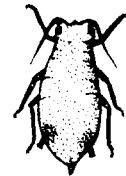
Bird Cherry-Oat Aphid
(olive green, brownish
patch at base of cornicles)



Russian Wheat Aphid
(spindle shaped body
with forked tail)



Greenbug
(pale green with darker
stripe down back)



Corn Leaf Aphid
(bluish green with black legs,
cornicles and antennae)

Important Aphid Predators



Ladybird Beetle Adult



Ladybird Beetle Larvae



Syrphid Fly Larvae
(eating aphid)



Aphid Lion



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Several species of aphids appear in field crops each season. Some are relatively unimportant and for the most part are kept in check by predators and parasites. Others may occur in high numbers for a short period but do little or no damage. A few must be watched very closely, or serious damage may occur.

Usually, aphids (with the exception of Russian wheat aphids) are most troublesome during periods of cool, wet weather. Late seeded crops are likely to be most severely infested.

Description and Damage

The greenbug, English grain aphid, corn leaf aphid and bird cherry-oat aphid are the principal species that cause problems in North Dakota small grains, corn and sorghum. However, the Russian wheat aphid was found causing minor damage to wheat during the 1992 growing season in Golden Valley and Slope Counties. This was the first known field infestation in North Dakota of this potentially serious aphid species.

Corn leaf aphid, greenbug, bird cherry-oat aphid and English grain aphid are soft bodied pear shaped insects with variations in body color. They have prominent antennae and conspicuous cornicles or "tailpipes." The Russian wheat aphid is different from these aphids, having a spindle shaped body, uniform lime green color, absence of prominent cornicles and a double or forked tail.

The greenbug and Russian wheat aphid are considered to be the most injurious, because during feeding these aphids inject a toxic saliva into the plants, causing discoloration and tissue destruction. Typical Russian wheat aphid symptoms include white and/or yellow streaks running the length of the infested leaf. Feeding will also cause inward rolling of leaves and often a purplish discoloration. Greenbugs cause a yellowish or tan discoloration of leaf tissue.

The English grain aphid begins population build-ups on the leaves of small grains and later in the season moves to the heads of grain. Plants can tolerate larger populations of English grain aphids than of greenbugs.

Corn leaf aphid populations can build up very rapidly on corn, especially on tassels. Infestations on corn are seldom economically important, except possibly in extremely late seeded crops or crops

growing under drought stress. The corn leaf aphid can also be found on barley, where it can inflict economic loss.

The bird cherry-oat aphid, like other grain aphids, spends almost its entire feeding period on various grains and grasses. In recent years this aphid has been quite prevalent in North Dakota small grain, but most years it is of minor economic significance. It prefers the lower part of small grain plants (especially barley). When lower leaves are killed by leaf diseases, bird cherry-oat aphid may infest the boot area.

Life Cycle

The greenbug is not known to overwinter in North Dakota. This insect survives during the winter months in states farther south with winged females being blown north each year. This is also probably true of the English grain aphid as well as partial infestations of all aphid species.

Those species that overwinter in northern states pass the winter in either the egg or the adult stages. Volunteer wheat and native grasses afford excellent overwintering areas for aphids. The aphids begin to emerge in spring and early summer. In 7 to 18 days after hatching, the female aphids give birth to an average of 50 to 60 living young. These may become either winged or wingless. These offspring begin giving birth to living young in about 15 days, and the insects continue, generation following generation, throughout the summer.

The rate of reproduction is enormous. If un-attacked by natural enemies, the mass of aphids which could be produced in a single season would be so great as to destroy all vegetation upon which they feed.

On the approach of cold weather, the female aphids give rise to winged males and females. These mate, and the mated females either produce eggs which pass through the winter or give birth to overwintering females.

A unique aspect of the Russian wheat aphid life cycle is that all reproduction takes place without male fertilization (parthenogenesis). In fact, while there are some reports of male Russian wheat aphids in Russia, none have been found in North America. Each female Russian wheat aphid can produce 40 to 50 nymphs during her lifetime of 40 days. About 7 to 10 days are required for nymphs to mature to adults and begin reproduction.

Natural Controls

Natural enemies of aphids play a big role in reducing their numbers. An exception is the Russian wheat aphid, which is largely protected within the curled leaves it creates by its feeding. Probably the greatest and most abundant predator of aphids in North Dakota is the ladybird beetle. It has been estimated that one ladybird beetle can consume up to 200 aphids in one day. Both the adult and larvae of the ladybird beetle are ferocious predators on aphids.

Other natural enemies of aphids include syrphid fly larvae, green lace wing larvae or aphid lions, and various parasitic wasps.

Often when the natural enemies of aphids are present in large numbers and a crop is well along in development, farmers are discouraged from spraying their fields, killing the aphids and the insects which feed upon them. If a reinfestation of aphids occurs, few natural predators will be present to control them. As a result, the farmer may have to make several costly applications to suppress the aphid reinfestations. Another possibility is that in situations where insect predator populations are escalating rapidly, their aphid suppression activities may be all that is required to maintain aphid numbers at non-economic levels.

Disease Transmission

The principal aphid-transmitted disease of cereal crops in North Dakota is barley yellow dwarf virus, which affects barley, oats and wheat. In oats the disease is called "red leaf." Although younger plants are more severely affected, most plants can become diseased at any growth stage.

Barley yellow dwarf virus persists in winter grains, perennial grasses and in the aphids. The severity of an infestation will depend upon the number of aphids present, the percent viruliferous aphids, crop growth stage and several other factors. You can't tell a viruliferous aphid from a clean one just by looking at it. Vector control has not been particularly economical or effective in controlling barley yellow dwarf, but avoiding early-autumn or late-spring planting can help. This allows the plants to develop at a time when aphid populations are lowest.

Scouting and Economic Thresholds

Small Grains

When surveying for aphids in small grains, make several counts throughout the field prior to heading. Too frequently farmers become alarmed after checking a few plants along the margins, especially near shelterbelts, where populations are high. Counts should be at least 50 paces apart and observations should be made well into the center of the field. Carefully examine 20 stems in each of five areas of the field, examining at least 100 stems per field.

Grain aphid research in recent years has revealed that previously utilized economic threshold levels have probably been too high. **It now appears that economic threshold levels for grain prior to heading need to be lowered. Therefore, the following economic threshold levels are suggested until more definitive research might indicate a need for further revision:**

Aphid Species	Economic Threshold
English Grain, Bird Cherry-Oat, Greenbug and Corn Leaf	12-15/stem - seedling to boot stage.
Russian Wheat Aphid	15-20% of tillers infested up to flowering. 20+% of tillers infested from flowering to early milk. Note: A tiller is considered infested whether it has one or several Russian wheat aphids present.

Corn

The critical period for damage by corn leaf aphids is during tassel emergence through pollination. If aphids are allowed to cover the tassel and upper two or three leaves, yield losses are likely to occur.

Corn fields should be scouted for aphids beginning about one week before tassel emergence. Pull and unroll the whorl leaves of plants selected at random to check for aphids. Treatment is suggested if 50 percent of the plants have 100 or more corn leaf aphids per plant during tassel emergence and if plants are under drought stress.

Sorghum

In forage sorghum, economic thresholds for greenbugs depend on plant size and growing conditions. Established infestations of greenbugs will damage sorghum, especially sorghum growing under moisture stress, until it reaches the dough stage. The thresholds at right apply to non-resistant sorghum as well as resistant varieties and so-called resistant varieties:

Plant Size	When to Treat
Emergence to about 6 inches	Visible damage (plants beginning to yellow) with colonies of green bugs on plants.
Larger plant to boot	Greenbug colonies causing red spotting or yellowing of leaves and before any entire leaves are killed.
Boot to heading	Before the death of one functional leaf.
Heading to hard-dough	When greenbug numbers are sufficient to cause death of two normal-sized leaves.

Insecticides for Aphid Control

Crop	Insecticide	Dosage (actual) toxicant)	Remarks
Barley, Oats, Rye, Wheat, Corn	Methyl parathion EC*	0.5 lb per acre	Aerial application only. Do not use within 15 days of harvest. 48 hour field reentry interval. Fields must be posted.
	PennCap M* (microencapsulated methyl parathion)	0.5 - 0.75 lb per acre	Do not apply within 15 days of harvest or grazing. To avoid injury to bees, do not apply during pollen shed if bees are visiting the areas to be treated during the foraging hours. 48 hour field reentry interval. Fields must be posted.
	Ethyl parathion EC*	0.25 lb per acre	Aerial application only. Do not use within 12 days of harvest (corn) or 15 days of harvest (small grains). Do not enter treated fields within 3 days after application. Fields must be posted.
Wheat, Barley, Corn and Sorghum	Di-Syston*	0.5 - 1.0 lb per acre	Aerial application only. Do not apply within 30 days of grain harvest or 28 days of corn or sorghum harvest. Use lower rate on plants up to tillering and higher rate after tillering.
Corn and Sorghum	Dimethoate (Cygon, Defend)	0.25 - 0.5 lb per acre	Do not feed or graze for 14 days (corn) or 28 days sorghum). Do not apply after heading. Do not apply more than 3 times per season.
	Ethyl parathion*	0.5 lb per acre	Do not apply within 12 days of harvest. Do not enter treated fields within 3 days after application. Fields must be posted. Do not apply methyl parathion or mixtures of methyl and ethyl parathion on sorghum as plant injury may occur.
	Lorsban	0.5 lb per acre	Follow label precautions. Do not feed to livestock for 30 days after application (sorghum) or 35 days (corn).

*EPA has classified this insecticide as a restricted use pesticide. Restricted use pesticides are to be applied by certified pesticide applicators.

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