

The Greenbug: A Pest in Wheat

The greenbug belongs to a group of insects known as aphids, which are small, soft-bodied, sucking insects. Most aphids possess a pair of appendages at the rear of the body, called the cornicles, but commonly referred to as “tailpipes.” The presence of the cornicles helps to identify the insect as an aphid and sometimes the type of aphid.

Other aphids associated with small grain besides the greenbug are the oat birdcherry aphid, corn leaf aphid, English grain aphid and the recently introduced Russian wheat aphid.

Greenbugs frequently infest wheat and other small grains in Kansas, but infestations often remain below damaging levels. Occasionally, however, relatively severe outbreaks develop in at least some portions of the state. Sometimes such outbreaks can become extremely destructive. For example, an infestation began during the mild fall of 1949-1950, and continued into the spring and eventually occupied an area from northern Texas to the southern portion of Canada. In the Central Great Plains area, more than a million and a half acres of wheat were abandoned or destroyed, and the yield of many additional acres was seriously reduced.

Life History

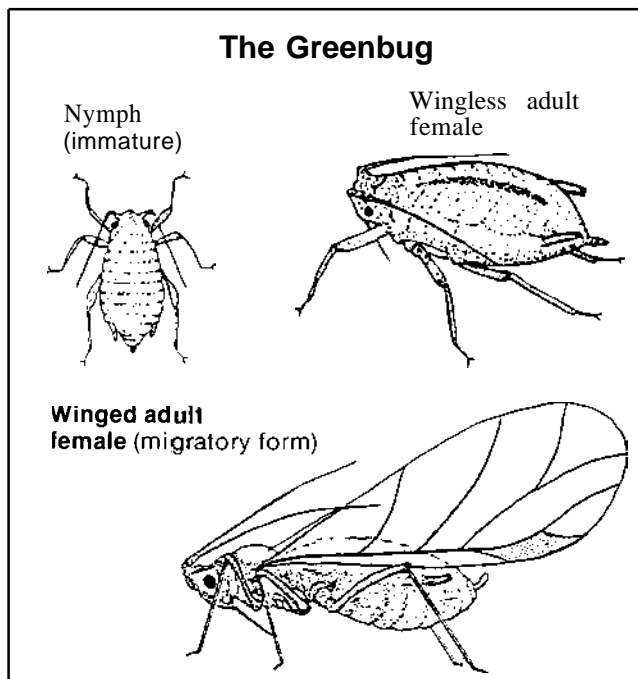
The greenbug, like other species of aphids, is born alive. All adults, for practical purposes, are females. Each female gives birth to living young at the rate of about two per day, although at times during warm weather, as many as five to six offspring may be produced each day. Production of offspring continues during the course of a two- to three-week period until the total progeny per female is within the range of 50 to 60 offspring. The young, which are called nymphs, resemble the adults, but are smaller. Growth is rapid and nymphs reach maturity within six to seven days following birth. This extremely high rate of reproduction is one of the reasons why aphids, and greenbugs in particular, are such serious pests.

To gain a better idea of an aphid’s reproductive capacity, assume you start with one mature greenbug per plant. From this one insect, you might expect a total population of 25 to 50 insects after one week. Upon entering the second week, the nymphs that were produced during the first couple of days would be starting to mature and reproduce. Then upon entering the third week, the nymphs of the second generation (“granddaughters”) would begin to reach maturity. Shortly thereafter, production per day would be in the hundreds, and soon into the thousands. This example is rather typical of what we often see at least for short periods during warm, mild weather during which food is plentiful, beneficial insect activity is low, and aphid survival is moderately high.

Greenbugs may be winged or wingless as adults. Winged forms are produced under stressed conditions, especially when food supply is becoming limited and wing formation serves as a mechanism for the insect to seek additional food in order to survive.

Damage

The greenbug sucks sap and during feeding injects a toxic substance into the plant. Symptoms initially appear as groups of small, reddish, pinpoint spots on the upper side of infested leaves. Later, as feeding continues, leaves turn yellow and begin to die. Under certain conditions, greenbugs can reproduce much faster than plants can



grow, and if undisturbed, infestations can become severe enough to kill the entire plant. Greenbugs tend to congregate on the underside of the lower leaves and gradually move upward as the population expands. The damage to wheat is believed to be a function of both levels of infestation and the length of time when a given infestation is present.

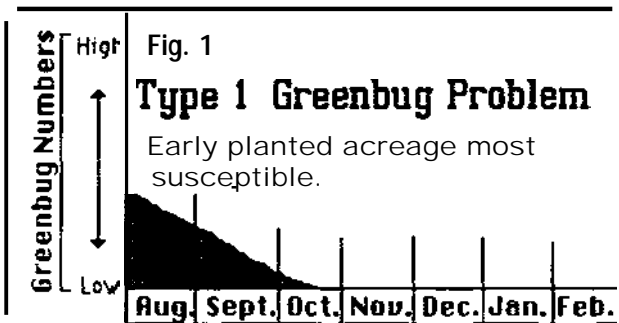
Infestations may occur as spots or as a general infestation throughout the field. Sometimes there appears to be a pattern in development associated with thin spots (more under cultural control) or in areas near windbreaks or farmsteads.

Recognizing Infestation Patterns in Wheat

The greenbug can infest small grains at almost any time during the growing season, but most infestations can be categorized with respect to the general time they occur. These patterns are illustrated in the figures that follow:

Early-Fall Infestations (Type 1 Problem)

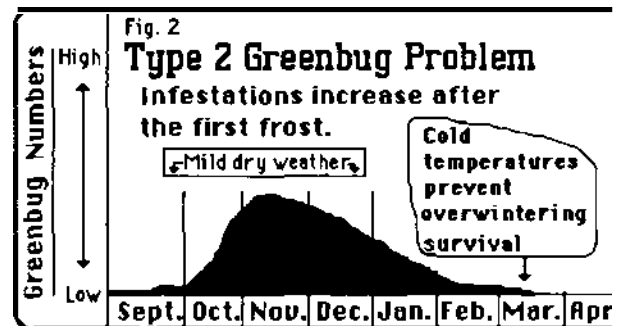
Figure 1 shows an example of an early season infestation. For simplicity it is called a Type 1 problem. In this case, greenbug activity is high in late August and early September, just about the time the earliest planted wheat is beginning to emerge. The source of infestation may be from sorghum or from movement of winged greenbugs from an unknown source. Unusually cool, late summer conditions may favor this occurrence. Usually these early season infestations are of relatively short duration, and they are often eliminated either by rains or an increase in beneficial insect activity:



Mid- to Late-Fall Infestations (Type 2 Problem)

Another developmental pattern is illustrated in Figure 2. It encompasses the period between the first killing frost and onset of winter dormancy in wheat. Beneficial insect activity nor-

mally declines markedly after the first frost, and if the weather remains mild and dry, it provides an ideal opportunity for greenbug development. It is during this period from late October through November when fall infestations are most likely to occur in Kansas. The production of winged greenbugs may accelerate and increase the rate of dispersal. Within days, greenbugs may begin to appear across large areas of the state. Severity of the problem varies with the year. Damage, if it occurs, is usually confined to the southern areas, but spots in the north will sometimes suffer injury. Usually infestations start to decline by late November as colder weather begins to predominate.



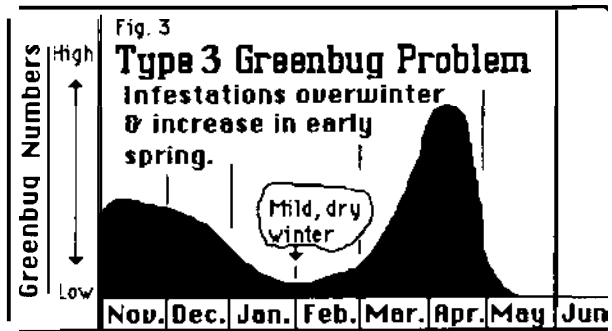
Overwintering Requirements

Generally the greenbug does not survive the winter in Kansas, except during about one year out of 10, and even then survival is usually limited to the southernmost counties. Greenbugs, unlike some pests, do not have a dormant stage, thus overwintering survival is determined by weather factors along with the amount of protection provided in a given field. As a rule, when temperatures drop below 40°F, reproduction becomes greatly curtailed, and mortality increases as temperatures continue to decline. Cold, wet weather is especially detrimental. Even so, infestations may be able to withstand short periods of 0°F temperatures. (The difference in air versus soil surface temperature can be surprising.) However, it is hard for the insect to withstand long periods of cold; thus, some 0°F weather followed by several days of subfreezing temperatures are usually needed to eliminate an infestation.

Early-Spring Infestations (Type 3 Problem)

Outbreaks that develop during the early spring period (February to April) are usually the result of a fall infestation that successfully survived the winter. When this happens, infestations may begin to escalate rapidly at or just after

green-up time. Damage usually appears first in the southern areas where overwintering numbers were higher, but may soon spread to other portions of the state.

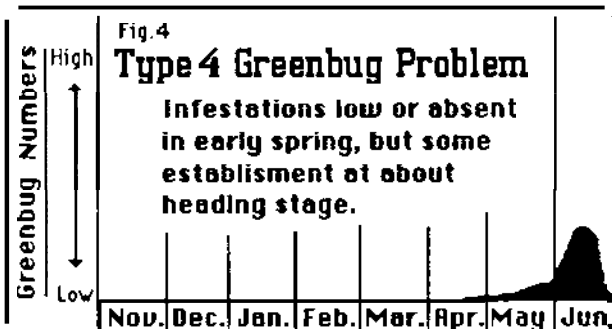


At times, growers may be unaware of a problem until “greenbug spots” (areas of yellowish to brownish plants) begin to appear. The plants in these spots are usually near death as a result of either high numbers of greenbugs, or greenbugs in addition to other stresses. Often infestations are high enough throughout such fields to warrant treatment, though it may be tempting to treat only the areas showing stress.

Beneficial insect numbers tend to be relatively low at green-up time (though not always), but soon begin to increase in response to climbing temperatures and the presence of greenbugs. Historically, by about mid-April, beneficial insects have reached numbers sufficient to begin bringing these early spring greenbug outbreaks under control.

Late-Spring Infestations (Type 4 Problem)

It is not unusual to encounter beginning infestations late in the season as wheat approaches the heading stage. Occurrence is more likely during periods of dry, mild weather—especially during years in which early infestations fail to occur. Although these late season infestations usually are not of economic concern on wheat, they do appear to serve as the major source of infestation for seedling sorghums.



Management Considerations

Cultural Control

Few cultural practices are known to be reliable in greenbug control on wheat or small grains. However, one aspect of greenbug behavior may be worthy of mention. Observers in watching greenbug flights have noticed that when a choice is available, migrating winged greenbugs appear to prefer settling in fields with large amounts of bare, exposed soil. In other words, large numbers tend to settle in a field with a thin stand compared to a nearby one with a denser stand; or a newly emerging field over an adjacently established field; or in some cases in a field with a minimum of surface residue compared to one with a large amount of straw on the surface. Perhaps with additional studies, some practical cultural management guidelines can be developed to take advantage of behavioral observations.

Weather

The importance of weather in overwintering is described on page 2. Mild, dry weather favors greenbug development. As temperatures increase, greenbugs reproduce faster, up to a point. When temperatures climb above the mid-90s, the amount of survival and rate of reproduction become affected, and one may observe that greenbugs have greater difficulty surviving on the more exposed upper parts of plants. Survival also becomes more difficult during hot weather under moisture-stressed conditions. Hot, drying winds usually result in a decline in numbers, especially in dryland fields and where greenbugs are relatively exposed. Beating rains may dislodge or drown the insects and frequently eliminate an infestation, especially where the plants are too small to provide much shelter.

Beneficial Insects

A variety of beneficial insects attack the greenbug. Lady beetles and parasitic wasps are the ones of major importance. Often lady beetles are of greater importance in the beginning of spring infestations, with parasites coming on later in sufficient force to bring outbreaks under control. The abundance of beneficial insects should always be considered in evaluating greenbug infestations. For instance, if lady beetles average one (larva or adult) per three or four feet of drill row, this may be sufficient to destroy a light to moderate infestation of greenbugs (infestations in the range of 50 to 75 per foot of row or less).

When lady beetle numbers similar to this are encountered, it may be advisable to postpone treatment decisions and resample as necessary during the next several days.

When parasitism reaches a level of between 10 and 15 percent (unless greenbug numbers are extremely high), it is advisable to delay treatment decisions, but continue to resample at two- to three-day intervals until the trend in population development is established.

Making Treatment Decisions

Current management recommendations suggest the use of insecticides when moderate numbers of the greenbug are present; the population appears to be increasing; some plants are showing signs of stress; beneficial insects are relatively low and weather conditions are expected to remain favorable for greenbug development for the next several days. The guide on this page is useful in estimating control needs based on various plant growth stages.

For a list of recommended insecticides, consult the current year's edition of Wheat Insect Management Recommendations, MF-745, available in County Extension Offices.

| Stage of plants | Number of greenbugs per linear foot | Comments |
|---|-------------------------------------|--|
| Seedlings, thin stands, less than 3 tillers | 50 | A relatively small number of greenbugs may cause injury, particularly prior to tillening and secondary root formation. |
| 3-to 6-inch wheat, 3 tillers or more | 100-300 | Somewhat higher numbers may be tolerated after tillening begins and secondary roots are established. Plant vigor and stand density should also be considered. |
| 6-to 12-inch wheat, Later growth stages | 300-500 | Dense, vigorous stands can withstand some moderately high infestations for a brief time, but damaging levels may be initially overlooked if not routinely sampled. Greenbugs are rarely of economic concern after jointing. |

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