Section 8

Insect Pests

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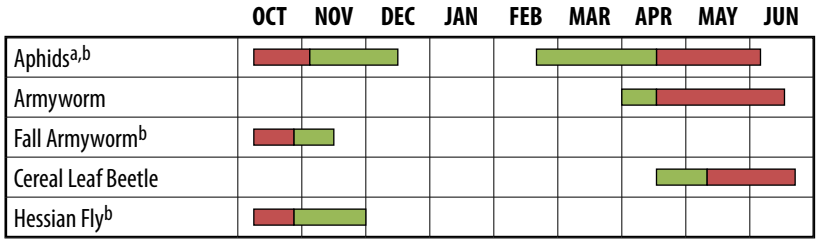
Under favorable conditions, several insects can cause significant yield loss in wheat. They can reduce plant vigor by removing sap or lower yields indirectly by feeding on leaf tissue. Some feed directly on grain heads or clip plant stems so that the grain falls to the ground. Fortunately, the probability of severe infestations is relatively low if sound management practices (crop rotation, planting after the fly-free planting date, and judicious nitrogen use) are followed. Early detection, correct identification, and assessment of pest problems allow appropriate management decisions to be made. Regular field monitoring is the best means of having the information needed to follow the recommended treatment guidelines. The small grain insect scouting calendar (Figure 8-1) indicates when pests are most likely to be present in a field.

Figure 8-1. Small grain insect scouting calendar.



The red portion of the bars above indicate periods of possible economic populations.
a Early planting and warm fall weather increases potential for aphids and barley yellow dwarf virus.
b Wheat planted before October 15 is subject to attack by this insect.

Photo 8-1. Lady beetle C-7 is a beneficial insect that feeds on aphids. Proper identification of insects is critical to pest management.

Field Scouting

Field scouting procedures differ among the key pests. However, look at three sites in fields up to 20 acres in size, and add one site for each additional 10 acres. For example, there would be five locations in a 50-acre field—three sites for the first 20 acres and two more for the additional 20. The samples should be collected from randomly selected sites away from field edges and waterways.

Photo 8-2. A greenbug (left) and a bird-cherry oat aphid (right). Bird-cherry oat aphids, common in the fall, are dark green with a red band across the end of the abdomen.

Photo 8-3. Parasitized aphids. Note the tan color compared to the gre3n healthy aphids also in the picture. Tiny wasps emerge from these "mummified" aphids and sting healthy ones.

Use the appropriate sampling method to collect information that can be compared directly to the treatment guideline for that specific pest. For example, the need for cereal leaf beetle control is determined by the average number of adults and/or larvae per stem. In some cases, methods for a pest may change during crop development. For example, aphid control prior to emergence of the flag leaf is based on the average number of aphids per foot of row. A rating system is used for these insects after the head emerges. (See IPM-4).

Key Factors

Planting date, weather, particularly temperature, and nearby sources are key factors that influence pest activity. Planting after the Hessian fly-free date reduces the potential for damage from cereal aphids, fall armyworm, Hessian fly and wheat curl mite in the fall. A killing frost before or soon after planting eliminates large numbers of these pests so that they are not present to move into the fields once the plants emerge. Nevertheless, abnormally long, warm falls or early springs favor aphid reproduction and can allow damaging numbers to develop from just a few individuals. The third key factor is volunteer or cover crop small grains that emerge well before recommended planting dates. These early plants can serve as a source of aphids, Hessian fly and wheat curl mite.

Insecticide Management

Insecticide applications are valuable in quickly reducing pest infestations that could reduce yield or quality. Read the label before purchasing and applying any pesticide. Use the lowest rates consistent with the severity of the infestation and size of the insects present. The label may recommend low rates for light to moderate infestations or for insects in the early stages of development; high rates may be needed for severe infestations or pests in later, more damaging stages.

Use selective insecticides when possible to minimize the effect on beneficial species that may be present. If using tank mixes, read the labels of all products in the combination. For example, sulfonylurea herbicides should not be applied with or near to the time that organophosphate insecticides are used. This combination can cause a variety of problems from temporary plant injury to yield reduction. (See ENT- 47).

Major Pests

Aphids

Corn leaf aphids and bird cherry-oat aphids are the most common fall species. Adults and nymphs can appear any time after plant emergence and can move barley and cereal yellows viruses into the crop, resulting in Barley Yellow Dwarf disease. The bird cherry-oat aphid is the most important vector.

English grain aphids are most abundant during spring and early summer. Infestations in grain heads can cause shriveled, lightweight kernels. Occasionally greenbugs can be found; fortunately this destructive species is relatively rare in Kentucky. (See Entfact-121 and Entfact-150).

Occurrence. Aphids may be found any time after plant emergence.

Description. Aphids are small, soft-bodied, pear-shaped insects. Color varies from green to blue to yellow. Their piercing-sucking mouthpart looks like a small tube arising from under the head.

Damage. Aphids can cause two types of damage. 1) direct damage by sap removal and 2) indirect damage by injecting a virus (primarily barley yellow dwarf virus) into the plants. Damage due to direct feeding is usually confined to the "head filling" stage and causes low test weights. Fall BYDV infections cause stunting and yellowing to purpling of the plants and can result in severe yield loss.

Always be on the lookout for new aphid pests. Currently, feeding by aphids in Kentucky produces little visible damage. If you see aphid-infested plants that are dead or dying, or that have tightly rolled leaves and/or severe yellowing, collect the aphids and have them identified. The yellow sugarcane aphid and Russian wheat aphid currently are not present in Kentucky but are potential major pests.

When to scout. In the fall until temperatures remain below 45°F and again in the spring when temperatures regularly exceed 45°F.

How to scout. Scout in the fall and in the spring before leaf emergence (Feekes 8, Zadoks 37). Examine three separate 1-foot lengths of row at each location. Look over the entire plant, especially near the soil line. Count and record the number of aphids on each 1-foot section of row, then calculate the average. This sampling is for making decisions relative to movement of BYDV. Label these records as "Counts."

Table 8-1. Rating based on number of aphids per head.

Rating	No. Aphids
0—none	none
1—slight	<50
2—moderate	50 - 100
3—severe	>100

This examination is for direct damage done by aphids to grain test weights. Label these records as "Ratings."

After heads have emerged in the spring, examine 10 grain heads at each scouting location for aphids. Record a rating of infestation based on the number of aphids per head (Table 8-1).

Economic threshold. In the fall when estimating risk of BYDV, consider a control if aphid "counts" average three (3) or more per row foot during the first 30 days post planting. An average of six (6) or more aphids per row foot from 30 to 60 days after planting, or ten (10) or more aphids per row foot thereafter, may justify a treatment (see Entfact-121). In the spring during "head fill" when using the rating scale for direct aphid damage, consider a control if an average rating of 2 (moderate) or greater is recorded.

Wheat Curl Mite

Wheat curl mite is important only because it is the only known vector for Wheat Streak Mosaic virus. The mite (and therefore the virus) requires a "green bridge" of volunteer wheat that grows in late summer and allows large numbers of mites to survive until the next production wheat crop emerges. (See Entfact-117).

Occurrence. Wheat curl mite can infest plants any time before frost. The pest is especially important in very early plantings and/or in the presence of volunteer wheat, known as a "Green Bridge".

Description. Wheat curl mite is microscopic so it cannot be seen by the naked eye. Feeding causes leaves to roll up, giving an "onion leaf" appearance. Mites can be seen by carefully unrolling the leaves, and examining it with a 10X hand lens.

Damage. Feeding by wheat curl mite produces indirect damage resulting from movement of wheat streak mosaic virus into the plant.

When to scout. There are no standardized scouting procedures for this pest.

Comments. There are no rescue treatments for this pest. All control is preventative.

Armyworm and Fall Armyworm

Most armyworm feeding occurs from late May through early June. Damage starts at the leaf edge and progresses inward, giving a scalloped appearance. While this can reduce yields, the most serious losses occur when armyworms chew through stems and clip off the grain heads. (See Entfact-111).

In some years, fall armyworms can damage emerging stands of small grains in the fall. Damage is possible from early September until the first heavy freeze.

Annual and historic progression of both of these populations can be tracked on the IPM web page. (See UK-IPM).

Occurrence. Mid April to late May. Luxuriant or lodged vegetation in low, wet areas is especially susceptible to attack. Cool, wet springs favor armyworms.

Description. Larvae are greenish brown with a narrow stripe down the middle of the back and two orange stripes along each side. The yellowish head is honeycombed with dark lines. Armyworms are about 1½ inches long when full grown.

Damage. Armyworms are primarily leaf feeders but they will feed on awns and tender kernels or clip off the seed heads. Infestations are more common in barley than in wheat. Armyworms may feed on oats, rye, and some forages.

When to scout. Mid April through maturity.

How to scout. Visit each field at least once a week.

First, check field margins and lodged grain. If armyworms are present, begin surveying in the standing grain. Armyworms feed during late afternoon, night, and early morning. They may be hidden under debris on the ground when you are in the field during the day.

Photo 8-4. Fall armyworms feed on emerging tillers.

Photo 8-5. True armyworms feed on the leaves and may clip awns.

Sample 4-square-foot areas at locations throughout the field using the number of sites determined by the "Field Scouting" section. Walk at least 30 paces into the field before sampling. Pick spots randomly and look at the leaves for signs of chewing damage. Armyworms feed from the edge of the leaf in toward the mid rib. Examine the ground for dark fecal droppings and look for the larvae under surface litter or in soil cracks. Note average larval length. Walk to the remaining locations, and repeat the process.

Record. Record the number of worms present in each sample. Note the average length of the armyworms in each area.

Economic threshold. An average of 16 ½- to ¾-inch-long armyworms per 4-square-foot sample.

Comments. Armyworms longer than 1¼ inch may have completed most of their feeding. If the grain is nearly mature and no head clipping has occurred, controls are not advised. Warm spring weather favors parasites and diseases that attack armyworms. Note on your scouting report the percentage of worms parasitized or diseased.

Photo 8-6. Cereal leaf beetle larvae produce long white streaks on the upper leaf surface. The light yellow, grub-like larvae are covered with brown waste material.

Photo 8-7. Larvae of cereal leaf beetle and leaf damage from cereal leaf beetle feeding.

Cereal Leaf Beetle

More of a problem on oats than wheat, overwintering adults can be seen on the leaves from early April until mid-May. Their distinct yellow eggs are laid from mid-April until late May; the larvae are active and feeding from late April through mid-June. Both adults and larvae remove long, narrow strips of tissue from the upper surface of plant leaves, producing a distinct symptom of long, white scars. (See Entfact-107)

Occurrence. April to maturity.

Description. A shiny black beetle with red legs and thorax, approximately ½ inch long. Larvae are pale yellow and soft bodied. They "glue" pieces of trash and leaf on their backs as camouflage.

Damage. Adults and larvae chew long, narrow strips of tissue between veins.

When to scout. April until maturity.

How to scout. Check 10 stems per sample site for larvae or adults.

Record. Record the total number of larvae and adults found on the 10 stems examined at each sample site. Calculate and note the average number per stem.

Economic threshold. Controls may be warranted when there is an average of more than one larva and/or adult per stem.

Hessian Fly

In the past, fall infestations of this pest have severely damaged wheat by causing stand reduction. Both stand loss and lodging of the plants can be seen in the spring. You can reduce losses greatly by following the recommended fly-free planting date for your area and using resistant varieties. Check for the overwintering (flaxseed) stage on weakened seedlings (October through March) or for the small, white, maggot-like larvae in leaf sheaths during May. (See Entfact-101).

Occurrence. Fall and spring.

Description. The Hessian fly adult is a small, fragile gnat. The larva is a very small, white, legless maggot. The larval stage is damaging and may be found between the leaf sheath and stalk. About two weeks after egg hatch larval maturity occurs, and feeding ends. The outer skin darkens and hardens as the larvae enters its overwintering stage. This overwintering larvae (flaxseed) is the stage most often found if an infestation has occurred. This is a small, brown, seed-like case, usually found at the base of the plant between the leaf sheath and stalk.

Damage. A fall infestation can result in stand loss and broken (lodged) plants. Spring infestations usually result in plants of reduced vigor and bad color. There are two generations per year.

When to scout. Survey fields one time after the first frost and from early spring until June.

How to scout. Look for thin, stunted, chlorotic patches in the field. Examine the base of these plants for presence of the flaxseed.

Record. Record the number of flaxseed found per 10 stems examined at each sample site. Note the presence of adults or larvae.

Economic threshold. There is no rescue treatment; however, preventive measures may be used to avoid future infestations.

Photo 8-8. Hessian fly-infested plants (center) appear stunted. There is no stem elongation and the leaves are usually broad and green.

Photo 8-9. The "flaxseed" or pupal stage of the Hessian fly can be found behind lower leaf sheaths of infested plants or below the soil line.

Photo 8-10. Hessian fly adult.

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