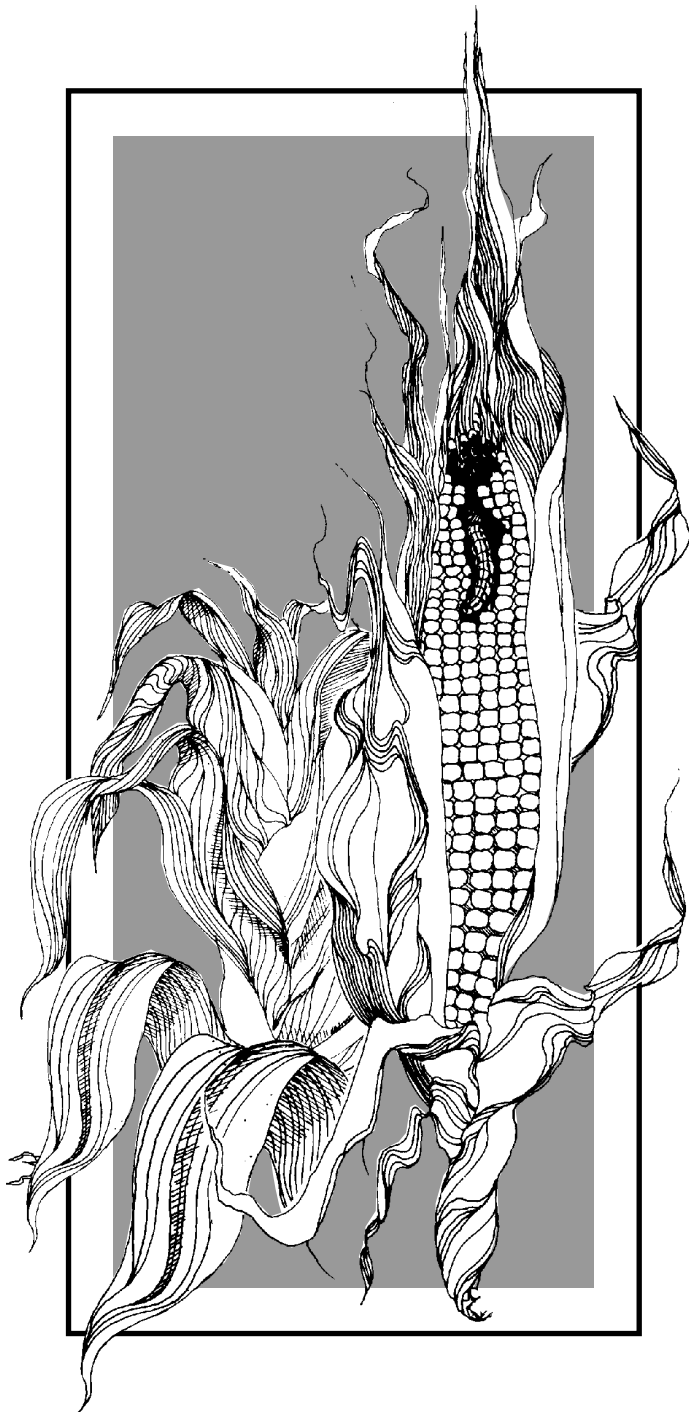


# Managing Insects

## Attacking Corn



A number of insects may attack corn, and some transmit diseases (for example, aphids transmit maize dwarf mosaic; leafhoppers transmit corn stunt). In some years, heavy infestations of insects may drastically reduce yields. The need for insecticide intervention, however, is erratic and often confined to small areas or isolated fields. Practical control measures call for sound knowledge of corn pests.

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## Insects Below Ground

Most insects that attack plants at or beneath the soil surface are most damaging to corn that is in the seedling stage. Although some of these insects may damage older plants, seedling corn is most susceptible to injury. The use of soil-applied insecticides is generally not recommended at planting because of the sporadic occurrence of pest population. Certain factors, however, increase the likelihood of serious infestations (that is, planting corn no-till or on land that was in pasture the previous year). Also, some fields have historically high populations of certain pests. Under these conditions, use of soil insecticides is often warranted.

**Cutworm**—Several species of cutworms attack corn seedlings. Cutworms cut small plants off just above the soil line, destroying the stand. The black cutworm is a common pest from this group.

Depending upon the species, most cutworms overwinter in the soil as larvae or pupae. For egg-laying purposes, female moths of the black cutworm tend to select



Cutworm



Rootworm



Billbug



Seedcorn Maggot

plants growing in low places in fields or on soils that have been flooded. The eggs may be deposited singly or in small clusters on the leaves and stems of young plants.

Cutworm larvae exhibit three feeding habits, depending on stage of growth. Young larvae (first and second instars) feed on the leaf surface, giving it a scuffed appearance. Late second and early third instar larvae eat holes in the leaves. The larvae then move from the leaf area into the soil and begin feeding by cutting plants at the soil surface. It is the larger overwintering larvae, present in the field at planting, that are most destructive.

Good seedbed preparation and weed removal help control cutworms, and they are seldom a problem in corn planted into a field that has been kept weed free by way of cultivation or herbicides for 2 to 3 weeks before planting. In reduced-tillage corn, the use of a preemergence insecticide suppresses cutworm populations. **Treat with foliar sprays if populations threaten to reduce stands below acceptable levels** (see *Corn Plant Population*, Extension Information Sheet 1548). Infestations causing 5 percent or greater “cutting” of corn seedlings generally justify treatment with insecticides.

**Southern Corn Rootworm**—The southern corn rootworm (larvae of the spotted cucumber beetle) damages corn by feeding on and tunneling inside roots. The slender larva is about one-half inch long when full sized, has three pairs of small legs just behind the head, and has brownish-colored patches on the head and tail ends. Larvae also may bore into the stem just above the roots, eating out the crown of young plants and killing the bud. Freshly damaged plants are often wilted, and a rootworm or evidence of its damage can often be found when the plant is dug up. Rootworms are likely to damage corn that has been planted too soon after turning under or making herbicide applications to existing vegetation, especially if legumes are present. Preemergence insecticides are recommended when planting after a legume cover crop.

**Seedcorn Maggot**—Seedcorn maggots are the larval stages of a fly that feeds on decaying organic matter in the soil. They are less than one-fourth inch long, pale white, and lack legs or an obvious head. This pest may attack germinating seed planted in cool, wet weather or corn planted into fields with freshly decaying vegetation. Heavy infestations reduce stands and cause stunting.

**Sugarcane Beetle**—This black beetle, about one-half inch long, burrows into the soil and feeds on the corn stem about one-half to 1 inch below the soil surface. This insect occurs sporadically from year to year. When it is abundant, it can destroy stands in isolated fields. Infestations most commonly occur in low, wet areas of the field.

**Lesser Cornstalk Borer**—This insect damages corn by boring into the plant at the base of the stem. This boring causes “deadheart” and may greatly reduce stands. Deadheart occurs when the terminal (central) growth point of the plant is destroyed, causing withering and turning yellow. Plants with a deadheart are stunted and do not produce harvestable ears. Infestations of lesser cornstalk borers are more likely to occur during dry conditions in sandy soil. Silken tubes, sometimes containing larvae, can often be found attached to the plants when they are dug up. Larvae are slender, greenish (often with a pink hue), and usually wriggle violently when disturbed.

**Corn Billbug**—The larvae of billbugs (snout-beetles) feed on the roots and bore into the stems of corn. Adults may feed some on corn foliage, especially on seedling plants. As they feed, the adults make holes in the leaves. These holes are often arranged in a row across the leaf when it unfurls.

**White Grub**—White grubs are the larval stages of May or June beetles. They are plump, white or cream colored, and curl into a “C” shape when exposed. The damage caused is similar to that of rootworms. Adult beetles lay eggs in sod or grassland. White grubs are likely to cause a loss of stand in corn planted on sod land. Under these conditions, a preemergence insecticide is generally recommended.

**Wireworm**—Wireworms are the larval stage of click beetles. The larvae are elongated, slender, and usually brown in color. Wireworms feed on seeds and roots, and also they bore into the underground part of the corn stem, causing the heart of the plant to die. They are often difficult to control in fields that were fallow or in pastures before planting corn. Like cutworms, the large larvae in the field at planting are the most destructive.

## Insects Above Ground

### Sucking Insects

**Chinch Bug**—Adults and nymphs of the chinch bug suck plant juices, causing plants to become weak, stunted, or even to

die. Adults are about one-fifth of an inch long and are black with white patches on the wings. Nymphs are reddish orange with a white band across their backs when small, turning darker to resemble the adults as they develop. They are more likely to cause problems in dry years. Seedling plants are most susceptible to chinch bug damage. **Start treatment on plants 6 inches tall or less if 20 percent or more of the plants have five or more chinch bugs per plant.** Plants taller than 6 inches can tolerate higher populations.

Chinch bugs are difficult to detect early in the season when populations are relatively low, because they usually hide behind leaf sheaths or around the base of plants, slightly below ground, and in crevices between the plant and the soil. Count both adults and nymphs when checking for chinch bugs. Some soil-applied insecticides provide control or suppression of chinch bugs. When foliar-applied insecticides are used to control chinch bugs, thorough coverage is essential.

**Note**—Rootless corn syndrome is often erroneously blamed on chinch bug damage; shallow planting and poor furrow closure are the primary causes of rootless corn. When seeds in the furrow are left exposed, they are at greater risk from seed feeders such as fire ants and birds. Also, corn planted less than 1 inch deep will develop its nodal roots at or near the surface, subjecting these roots to many factors that can retard growth (that is, hot and dry soil, chemical injury, and surface-feeding insects). For corn taller than 10 inches, severe chinch bug injury is almost always the result of sustained, large, and easily observed populations of chinch bugs.

**Stink Bugs**—Several species of stink bugs occasionally attack corn and do extensive damage, especially in the southern part of Mississippi. These insects damage seedlings and more mature plants. They suck sap from the plant, causing the whorl area to become yellow and sometimes to die. Stink bugs also probe through the shuck of a developing ear of corn and suck the juice from individual kernels. This damage may open entrances for other insect pests or fungi to cause extensive damage. The greatest potential for damage, however, occurs when stink bugs feed on ears that are less than three-fourths of an inch long, beginning about 2 weeks before silking. This damage may result in total ear loss by causing curled (cow-horned) ears.

Stinkbug populations may be unusually high following mild winters. In such years, stinkbugs may be an early-season pest of corn. Stinkbug feeding can affect growth and development of young corn plants. Treat corn less than 2 feet tall if 10 percent of the plants have one or more stinkbugs present.

Intensify scouting for stink bugs around the seventh or eighth week after emergence, just before ear shoots have fully emerged. **Treat if you find an average of one to two stink bugs per plant**, but keep in mind that stink bug populations are sometimes much higher around the outer edges of fields than in the interior portion. Do not treat an entire field for a problem that is limited only to the edges. Continue to scout following treatment, because stink bugs are strong fliers and reinfestation can occur.

**Aphids**—Aphids (plant lice) are soft-bodied insects that feed by sucking plant juices. The corn leaf aphid is the most common aphid found on corn, but several other species may also occur. Heavy infestations may cause sticky “honeydew” on leaves. Beneficial insects usually control aphids, and insecticide controls are seldom warranted. Very young corn (less than 3 inches tall) may require treatment when an average of 10 or more corn leaf aphids are found per plant.

## Whorl-Feeding Caterpillars

**Corn earworms** and **fall armyworms** are the most common pests found feeding in the whorl of corn plants before tasseling and silking. It is important to identify the species of insect involved because some insecticides recommended for use against corn earworm will not control fall armyworm. Also, the **European corn borer** and the **southwestern corn borer** may be found feeding in whorls and have different treatment thresholds (see discussion under “Stalk-Boring Caterpillars”).

Corn earworms vary greatly in color, from light green or pink to dark brown, with alternating light and dark stripes running lengthwise on the body; they are usually lighter colored on the underside of the body. The head is yellow and unspotted, and the legs are dark colored. The surface of the larva is somewhat coarse, with small thorn-like projections. The fall armyworm often has a somewhat darker head and, particularly with larger larvae, the head has a prominent, white inverted Y on the front. Choose an insecticide that is effective against the complex of caterpillars present in the whorl when more than one species is found and control is necessary.

Corn plants can tolerate a considerable amount of damage from the whorl-feeding caterpillars, and populations seldom build to damaging levels unless corn is planted after the recommended planting dates. Consequently, timely planting is the preferred method of management. Heavy, sustained infestations cause deadheart and can adversely affect yield.

Plants in the seedling-to-early-whorl stage (emergence to about 1.5 feet high) are most susceptible to damage from whorl-feeding insects, but plants up to the mid-whorl stage (about 3 feet high) can also be damaged. Check plants regularly during this early-whorl period, especially if planted after April 25. **Control is justified if an average of one corn earworm and/or fall armyworm per plant is detected from emergence to midwhorl stage of corn.**

Whorl-feeding insects are in a protected area, and the use of **adequate spray volume is critical** to obtain control. Apply insecticides in a minimum of 15 gallons of spray volume per acre through nozzles set up to spray directly into the whorl. Aerial applications will not give good control of worms feeding in the whorl.

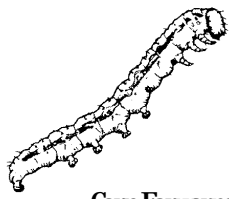
Both species will also feed on the developing tassel within the whorl. Plants with severely damaged tassels, however, will usually produce harvestable ears. As much as 70 percent of the tassels in a field can be destroyed before ear pollination is significantly affected.

## Stalk-Boring Caterpillars

**European corn borer** and **southwestern corn borer** are two other insects commonly found in the whorl of corn. Because European and southwestern corn borers tunnel into the stalk, their feedings are potentially more destructive than feeding by the corn earworm or the fall armyworm. Thus, fewer European or southwestern corn borers are needed to justify an insecticide application (see following discussion).

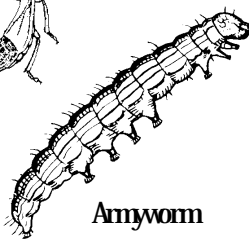
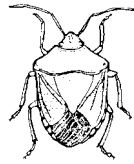
**European corn borers** are found primarily in the northern part of Mississippi. The insect in the larval or borer stage is gray or tan with rows of light-brownish spots or pinkish lines running lengthwise, often giving it a purplish coat. Three generations per year are normal in Mississippi. First-generation borers attack corn plants in the early stage of development. Feeding signs show up as rows of pinholes or rectangular lesions in the leaf after it unfolds from the whorl. After larvae feed on leaf surfaces in the whorl of the plants, they bore into the

## Above-Ground Pests



Corn Earworm

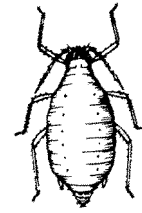
Stink Bug



Armyworm



Chinch Bug



Aphid



European Corn Borer

stalk where their tunneling destroys food channels. The tunneling of second- and third-generation borers may affect yields by causing stalk breaking (lodging) and ear drop.

**Southwestern corn borers** occur statewide but presently are more abundant in the Delta than in other areas of the state. Larvae are white with black spots during the growing season. They cause damage by leaf feeding, stalk tunneling, ear feeding, and girdling of the stalks. In pretasseling corn, young larvae feed in the whorl for 10 to 12 days after hatching. Their feeding is similar to that of the European corn borers; however, more scarring or feeding on the leaves may be found. After feeding on the leaves, larvae move down the stalk, bore in, and tunnel, which may result in yield loss.

There are three generations of southwestern corn borers each year. Pheromone traps can be used to determine the timing of the moth flight associated with each generation. Large numbers of moths in the traps indicate a need for intensified scouting for eggs and small larvae. Part of the second generation and all of the third generation overwinter. In preparing for overwintering, large larvae girdle the corn stalks from the inside out. This girdling may result in lodging in more than over 50 percent of the stalks, particularly in late-planted corn. The overwintering borer, found inside the stalk at the base of the stem below the soil level, is creamy white. Corn planted within the recommended planting dates and harvested in a timely fashion will generally not be susceptible to girdling damage by the third generation of borers.

Check fields periodically for European and southwestern corn borers throughout the growing season. **Apply insecticides for southwestern corn borers when 25 percent or more of the plants have larvae or egg masses present. For European corn borers, apply insecticides when larvae or egg masses are present on 50 percent of the plants.** Good insecticide coverage is essential for satisfactory control, and insecticides must be applied before lar-

vae tunnel into the stalk to achieve satisfactory control. Tillage is an important mechanism for reducing overwintering populations of corn borers in infested fields (see discussion under "Timely Harvest, Sanitation, and Tillage").

### Ear-Feeding Caterpillars

**Corn earworm and fall armyworm**—Although corn earworms feed in the whorl, they prefer to feed in silking ears. The earworm moth lays its eggs on the silks or husks, and hatching occurs in 2 to 3 days. The young earworm larvae work their way through the mass of silks to the tip of the ear where they feed on the kernels. Fall armyworms will also commonly be found feeding in ears. These worms are almost impossible to control once they get into the developing ear. It is economically impractical to attempt control of corn earworms and fall armyworms feeding in the ears of field corn because of the number of insecticide applications (five to seven) needed to give satisfactory control.

**European and southwestern corn borers**—These species will tunnel into developing ears and ear shanks. Tunneling in ear shanks may cause ears to break from the plant before harvest. As with the corn earworm and fall armyworm, controlling worms inside the ear is not feasible; however, European and southwestern corn borers do not begin extensive tunneling until about 10 days old. After tasseling, small worms are usually found feeding behind the collars (sheath or base) of leaves. Insecticide applications, when needed to prevent stalk tunneling, will also reduce damage to ears. You must time applications to coincide with the presence of eggs and small larvae to achieve adequate control.

### Insects That Attack Mature Corn in the Field

**Maize weevil and pink scavenger caterpillars** may attack more mature corn in the field. The maize weevil normally is considered a stored-grain pest; however, the first

infestations of this insect usually occur in corn in the field before harvest. Insecticidal control is impractical because of the difficulty in contacting the pest with insecticides. Control measures include the following cultural practices:

- Plant in the spring as early as possible.
  - Harvest as soon as the crop is matured.
- This measure is especially important in controlling maize weevil and pink scavenger caterpillar and will also reduce the likelihood of lodging or ear drop caused by corn borers.

### Integrated Control

The best approach for pest control is to integrate all available management practices to reduce damage. Proper selection of corn varieties and planting dates, regular scouting for pest infestations, judicious use of insecticides, timely harvest, and sanitation of crop residue will reduce the likelihood of insect damage.

### Resistant Varieties / *Bt* Corn

Grow resistant varieties if available. Some corn varieties have characteristics that help to minimize insect damage. One example is resistance to the maize weevil. If resistant varieties prevent infestations in the field, these pests usually will not become a problem after storage.

Select varieties with long, tight shucks. Loose shucks around the tips of the ears can lead to losses by birds and insects. Early-maturing varieties of corn may be less damaged by European corn borer, southwestern corn borer, corn earworm, and fall armyworm.

Varieties of transgenic *Bt* corns, in which the plants express a toxin from *Bacillus thuringiensis*, are available. Currently, there are restrictions on the amount of *Bt* corn than can be planted in Mississippi. *Bt* corn can be expected to give excellent control of European and southwestern corn borers. Moderate to good control of corn earworms and fall armyworms

in pretassel corn can also be expected. Some *Bt* varieties do not express the toxin in the silks and kernels, and thus, less control of corn borers, corn earworm, and fall armyworm can be expected in these varieties when infestations occur during ear development. *Bt* corn does not control non-lepidopteran pests (for example, chinch bugs, corn rootworms, white grubs, stink bugs, etc.).

### **Plant Early**

Insect populations generally increase as the season progresses; thus, late-planted corn is usually more severely damaged than early corn. Corn earworm and fall armyworm damage is usually light until July and August. Infestations of the first-generation corn borers are much lighter than the second and third generations.

### ***Suggested dates for planting corn:***

#### **South Mississippi**

February 25 to March 15

#### **South-Central Mississippi**

March 5 to April 10

#### **North-Central Mississippi**

March 15 to April 20

#### **North Mississippi**

March 20 to April 25

## **Timely Harvest, Sanitation and Tillage**

Harvest the crop as soon as it matures to reduce further insect damage such as lodging resulting from corn borer damage. **Stalk destruction is the only effective method of reducing overwintering populations of corn borers.** It is particularly effective for southwestern corn borers because corn is its principal host. Destroy stalks, and plow up stubble (if erosion is not a problem) as soon after harvest as possible to reduce survival of corn borers, especially in areas where corn borers are historically common. For southwestern corn borers, plow up stubble in a manner to expose the stalk base where overwintering larvae are found. Plowing in the early spring will cause rotting of corn residue and will help destroy European corn borers.

## **Scouting Corn for Insect Pests**

Regular scouting of corn fields is the best method to determine the presence of damaging insect populations. Sample at least 10 consecutive plants at each of four to five representative sites within a field. Treatment thresholds for many corn pests are much higher than in other crops such as cotton; therefore, a relatively small number of plants can generally be checked to deter-

mine the presence of a particular pest. If pests are present, intensify your sampling to more precisely determine infestation levels. Corn is most susceptible to insect injury in the seedling stage. From emergence until the plants are about 10 inches tall, scout each field every 4 to 5 days. Continue sampling for insect pests when plants are taller than 10 inches at about weekly intervals until maturity.

**For plants less than 6 inches tall**—Record the number of plants examined and the number with five or more chinch bugs. Observe plants for signs of feeding or wilting from cutworms or other soil insects. Cutworms often cleanly cut the plants off near the soil surface. If cut plants are found, determine whether anticipated stand loss will reduce the plant population below recommended levels.

**From emergence until tassel development**—Look for signs of leaf feeding by caterpillars, flea beetles, or other pests on leaves within the whorl of plants. As leaves emerge and unfurl from within the whorl, feeding damage usually appears as small, often regularly spaced holes or long scars on the leaves. Cut plants below the whorl, and examine the leaves for worms. Record the species and average number of worms present per plant. If no live worms are found in the first three to four plants inspected and if no whorl feeding damage is evident, move to the next sample location.

**After tassels begin to develop**—Count the number of stink bugs present by visually examining the plants. Concentrate your examination in the tassel area to the ear zone of the plant.

For late-planted corn, pay special attention for second- and third-generation corn borers. Most of the eggs laid by European and southwestern corn borers are laid in shingle-like groups on the upper and lower surfaces of the ear leaf or the two leaves above and below the ear leaf. You can find evidence of recent feeding by small larvae at the base of leaves, behind the leaf sheath. If you do find evidence of borer infestation, randomly sacrifice a few plants in representative areas of the field, and examine the stalks to determine the level of corn borer tunneling. Larvae that are in tunnels cannot be controlled with insecticides but may indicate the potential size and timing of the next generation. You can also examine randomly selected ears, including between the husks, for the ear-feeding pests. Corn earworm, fall armyworm, and the corn borers may all occur in the ear, so species identification is important.

## **Use of Insecticides**

Insecticides are still valuable tools for controlling insect pests. In using insecticides, apply the proper rate at the proper time. Worms are harder to kill as they become larger. When choosing an insecticide to control pests of seedling corn, be sure to select an insecticide that will control all pests that are likely to occur.

To avoid delays and poor application, it is important that your spray equipment is properly calibrated and ready for use before an insect infestation is discovered. Consider spray readiness when deciding whether to use an insecticide at planting. You may want to use a soil insecticide on at least part of the acreage if a postemergence foliar application to the entire crop cannot be made in a timely and effective manner.

**Note**—Whenever possible, insecticide recommendations are based on data from tests within Mississippi or surrounding states. Because of the sporadic distribution of some pests, however, local data are not always available.

**Application of Foliar Sprays**—When using foliar sprays, proper application is critical to achieving control. It is sometimes vital to increase spray volume and/or direct the spray to the specific site occupied by the target pest. For example, chinch bug sprays should be applied with two nozzles, one on either side of the row, directed toward the base of the plant with a minimum spray volume of 15 gallons per acre. Apply sprays for whorl-feeding caterpillars through a single nozzle per row mounted to spray into the whorl. Directed applications can often be banded so that less insecticide is required, thus reducing cost.

For many corn pests, applications of insecticides by ground are much more effective than those by air. When conditions are wet or the corn is too tall for ground application, aerial application can be made for some pests. For example, aerial applications can still be expected to give adequate control of cutworms and, in some cases, chinch bugs. In contrast, aerial applications for any whorl-feeding caterpillar would generally not be recommended because poor control often results. For corn borers, aerial applications are generally more effective after tasseling than before tasseling because the small larvae are no longer hidden within the whorl, but effective control would usually be no greater than 70 to 80 percent.

**Hopper Box Treatments**—Several commercial hopper box treatments are available for use while planting corn. They often contain a fungicide and an insecticide.

These are used to protect germinating seeds and very young seedlings from damage by wireworms and seedcorn maggots. The duration and degree of protection are limited because of the small amounts of active ingredients used. **Follow label directions** in mixing protectants with seed.

**Preemergence, Soil-Applied Insecticides**—Rates of application for soil-applied insecticides are generally given in pounds of formulated product per 1,000 row feet. All rates for granular (G) materials in this publication are given for application on a 7-inch band for 30- and 38-inch row spacing. Some granular insecticides can be applied directly in-furrow, but others cannot because of phytotoxicity. **Be sure to check the label for restrictions, for specialty rates for specific problems, or for other types of application.**

Two common ways to apply soil insecticides are in-furrow or banded. Banded applications are made across the center of the row on a narrow band to the soil surface. T-banded applications are a variation where the insecticide is placed in a band over an open furrow (making a T shape). You can inject some soil insecticides with liquid fertilizers; however, not all fertilizer and insecticide mixtures are compatible. **Refer to the label for restrictions on mixtures of fertilizers and insecticides.**

**Insecticide Injury and Interactions with Herbicides**—Serious plant injury (phytotoxicity) can occur from the interaction of certain insecticides with herbicides or from improper application of insecticides. For example, Thimet can seriously injure corn if applied in the furrow and should **not** be applied in this manner. The sulfonylurea herbicides Basis and Basis Gold **cannot** be used following application of the soil insecticide Counter CR, in-furrow or banded. Banded applications of Counter CR are labeled for use with other sulfonylurea herbicides such as Accent or Beacon. In-furrow applications of Counter CR, however, should not be used if sulfonylurea herbicides will also be used because they will

cause crop injury. **Carefully read labels for precautions and restrictions on insecticide use in combination with specific herbicides.**

**Insecticide Formulations and Labels**—Liquid formulations are EC (emulsifiable concentrate), F (flowable), and WSL or L (water soluble liquid). The number following the name of a liquid insecticide indicates the pounds of active ingredient contained in a gallon of formulated product. For example, Lorsban 4E has 4 pounds of active ingredient per gallon. Some product names do not indicate the amount of active ingredient, but this information can be found on the insecticide label.

For powder and granular formulations (WP, SP, and G), the active ingredient is expressed as a percentage. For example, Sevin 80 SP contains 80 percent active ingredient in a pound; thus, a 10-pound bag would contain 8 pounds of active ingredient. To arrive at the active ingredient in an SP, WP, or G, multiply the figure following the name by the net contents of the container and divide by 100. **For example:** a 50-pound bag of Lorsban 15G contains 7.5 pounds active ingredient per bag ( $15 \times 50 = 750$ ,  $750/100 = 7.5$ ). If the rate calls for 1 pound active ingredient per acre, one 50-pound bag will cover 7.5 acres.

**Precaution**—Always thoroughly read and follow the label before using insecticides. Be especially careful to follow all restrictions and limitations; wear and use proper safety equipment. Observe proper preharvest intervals, depending on whether the crop is to be used for grain or for silage. Calibrate application devices to ensure proper rate.

### Tillage

Reduced or no-till practices, if used in corn production, may increase the risk of some insect damage, especially from soil insects (wireworms, white grubs, cutworms). The risk of stand damage is further increased if a cover crop (vetch or ryegrass) is used between corn crops. Insect popula-

tions are not disturbed as much as with conventional tillage practices, and in the case of cover crops, insects may be attracted to these fields. The insects use the cover crop as a source of food in the fall and as protection in winter. The following spring the insects will move to the corn after the cover crop is cut or a herbicide is applied.

Decaying vegetation may create additional problems, particularly when the weather is cool. As the material decays, it is attractive to the adult (small fly) seedcorn maggot. The females deposit their eggs on the soil surface. After hatching, the young maggots work into the soil and feed upon the germinating seed.

The best method of dealing with soil insect problems in no-till corn is to apply an insecticide at planting (see recommendations). If you do not use an insecticide, these steps may help reduce the chance of damage:

- Do not plant within the same drill year after year.
- Use herbicide on cover crop at least 2 weeks before planting (preferably 3 to 4 weeks).
- Be sure the planter is planting at the proper depth to ensure good coverage of seed with soil.

### Protect Grain After Harvest

Stored-grain pests can severely damage corn after it is harvested and stored. To prevent this from occurring, take proper preharvest precautions. Clean out and treat storage bins before filling them with a new crop. Treat and monitor corn that is to be stored for any length of time. Detailed information on protecting corn from stored grain pests can be found in **Extension Publication 913, Insect Control for Farm-Stored Grain.**

**Table 1. Foliar-Applied Insecticides** (see previous discussion for treatment thresholds)

| Insect   | Insecticide                               | lb a.i./acre | Precautions and Remarks   |
|----------|---|--------------|---|
| Cutworms | carbaryl (Sevin - 80 SP, 80 WSP, 4F, XLR) | 2.0          | For best control, direct sprays toward base of plants, and apply with a minimum of 15 gallons of water per acre. Lorsban may not work as well if the top of soil is dry and crusty, and some incorporation may be necessary. Aerial applications of Lorsban are not allowed in Mississippi. |
|          | chlorpyrifos (Lorsban 4E)                 | 1.0-1.5      |   |
|          | cyhalothrin (Darate)                      | 0.015-0.025  |   |
|          | esfenvalerate (Asana XL)                  | 0.03-0.05    |   |
|          | permethrin (Ambush/Pounce)                | 0.10-0.20    |   |
| Billbugs | chlorpyrifos (Lorsban 4E)                 | 1.0-1.5      |   |

| <b>Insect</b>                         | <b>Insecticide</b>  | <b>lb a.i./acre</b> | <b>Precautions and Remarks</b>   |
|---------------------------------------|---|---------------------|--|
| Lesser cornstalk borers               | chlorpyrifos (Lorsban 4E)                                     | 1.0-1.5             | This insect usually occurs sporadically and in late-planted corn during dry years. It tends to be more of a problem on sandier soils.  |
| Flea beetles                          | carbaryl (Sevin 80 SP, 80 WSP, 4F, XLR)                       | 1.0-2.0             | Small feeding streaks or window-pane feeding patches occur on the leaves. Treat when notable feeding on several leaves causes an occasional leaf to appear whitish. Spray for thorough coverage.   |
|                                       | cyhalothrin (Warrior T)                                       | 0.02-0.03           |  |
|                                       | esfenvalerate (Asana XL)                                      | 0.03-0.05           |  |
|                                       | methomyl (Lannate)  | 0.25-0.45           |  |
|                                       | permethrin (Ambush/Pounce)                                    | 0.1-0.2             |  |
| Sugarcane beetle                      | chlorpyrifos (Lorsban 4E)                                     | 1.0                 | Because of the highly sporadic nature of this pest, there is little information on effective insecticides. Granular applications of Lorsban or Counter will provide some suppression, but Furadan has been shown to have limited efficacy. For rescue treatments, Lorsban 4E applied as for chinch bugs seems to be the most promising treatment.  |
| Aphids                                | dimethoate (Cygon)  | 0.5                 | These insects rarely cause problems in field corn. Seedling corn less than 3 inches tall is most susceptible. Consider treatment if plants less than 3 inches tall average 10 aphids per plant.  |
|                                       | esfenvalerate (Asana XL)                                      | 0.03-0.05           |  |
|                                       | methyl parathion (including Penncap-M)                        | 0.25-0.50           |  |
|                                       | malathion   | 1.0                 |  |
|                                       | methomyl (Lannate)  | 0.25-0.45           |  |
| Chinch bugs                           | carbaryl (Sevin 80 SP, 80 WSP, 4F, XLR)                       | 1.0-2.0             | See discussion under Chinch Bug. Use a nozzle on either side of the row to direct spray toward the base of the plants. Use a minimum of 15 gallons of spray volume per acre.   |
|                                       | chlorpyrifos (Lorsban 4E)                                     | 0.5-1.0             |  |
|                                       | cyhalothrin (Warrior T)                                       | 0.03                |  |
|                                       | esfenvalerate (Asana XL)                                      | 0.03-0.05           |  |
| Stink bugs                            | methyl parathion (including Penncap-M)                        | 0.25                | Intensify scouting beginning 7th or 8th week after emergence. Treat when one-two stink bugs are found per plant.   |
|                                       | cyhalothrin (Warrior T)                                       | 0.02-0.03           |  |
| Grasshoppers                          | carbaryl (Sevin 80 SP, 80 WSP, 4F, XLR)                       | 1.0-1.5             | Grasshoppers rarely require treatment in corn planted in a timely manner. Consider treatment if feeding threatens to reduce stands below recommended plant population or significant injury to developing ears is occurring.   |
|                                       | carbofuran (Furadan 4F)                                       | 0.25                |  |
|                                       | cyhalothrin (Warrior T)                                       | 0.02-0.03           |  |
|                                       | dimethoate  | 0.5                 |  |
|                                       | esfenvalerate (Asana XL)                                      | 0.03-0.05           |  |
|                                       | methyl parathion (including Penncap-M)                        | 0.5                 |  |
|                                       | malathion   | 1.0                 |  |
| Corn earworms                         | carbaryl (Sevin 80 SP, 80 WSP, 4F, XLR)                       | 1.0-2.0             | These controls are recommended for corn earworm feeding in whorls. It is not economically practical to treat for corn earworm feeding in ears because of the number (five-seven) of applications needed. Use a minimum of 15 gallons of spray volume per acre and direct into the whorls.  |
|                                       | cyhalothrin (Warrior T)                                       | 0.015-0.025         |  |
|                                       | esfenvalerate (Asana XL)                                      | 0.03-0.05           |  |
|                                       | methomyl (Lannate)  | 0.25-0.45           |  |
|                                       | permethrin (Ambush/Pounce)                                    | 0.1-0.2             |  |
| Fall armyworms                        | carbaryl (Sevin 80 SP, 80 WSP, 4F, XLR)                       | 1.5-2.0             | See discussion under Whorl-Feeding Caterpillars. Use a minimum of 15 gallons of spray volume per acre, and direct into the whorls.   |
|                                       | cyhalothrin (Warrior T) – control of 1st and 2nd instars only | 0.02-0.03           |  |
|                                       | methomyl (Lannate)  | 0.45                |  |
| European and Southwestern corn borers | <i>Bacillus thuringiensis</i> (Bts)                           | see label           | See discussion under European corn borer and southwestern corn borer for information on treatment thresholds, distribution, etc. For applications during whorl stage, use a minimum of 15 gallons of spray volume per acre, and direct into the whorls. Insecticides containing <i>Bacillus thuringiensis</i> are available under several trade names. Refer to label for specific application rates and instructions. |
|                                       | carbaryl (Sevin 80 SP, 80 WSP, 4F, XLR)                       | 1.0-2.0             |  |
|                                       | carbofuran (Furadan 4F)                                       | 0.75-1.0            |  |
|                                       | chlorpyrifos (Lorsban 4E)                                     | 0.5-1.0             |  |
|                                       | cyhalothrin (Warrior T)                                       | 0.02-0.03           |  |
|                                       | esfenvalerate (Asana XL)                                      | 0.04-0.05           |  |
|                                       | permethrin (Ambush/Pounce)                                    | 0.1-0.2             |  |

**Table 2 Insecticides Applied Preemergence**

| Insecticide                 | Rate: amount of formulated material per 1,000 row feet (lb or pints/acre) <sup>1</sup> |                                  | Insects Controlled <sup>2</sup>   | Precautions and Remarks   |
|-----------------------------|--|----------------------------------|---|---|
|                             | 30-inch rows   | 38-inch rows                     |   |   |
| Furadan 4F (carbofuran)     | 2.5 oz (2.7 pints)   | 2.5 oz (2.2 pints)               | Corn rootworms, Flea beetles, Wireworms, Seedcorn maggots, Billbugs   | <b>Warning</b> – Liquid Furadan is highly toxic (handle with care).   |
| Lorsban 15G (chlorpyrifos)  | 8-16 oz (8.7-17.4 lb)  | 8-16 oz (6.9-13.8 lb)            | Corn rootworms, Cutworms, Billbugs, Wireworms, White grubs, Seedcorn maggots, Chinch bugs (suppression), Lesser corn stalk borers   | <b>Lorsban 15G</b> – The higher rates may be used for some types of applications and insects. See label for application information for specific insects.<br><b>Lorsban 4E</b> – Injury may result if applied in-furrow. See label for specific precautions and restrictions. |
| Lorsban 4E                  | 2-6 pints/acre applied broadcast   | 2-6 pints/acre applied broadcast |   |   |
| Thimet 20G (phorate)        | 6 oz (6.5 lb)  | 6 oz (5.2 lb)                    | Corn rootworms, Wireworms, White grubs, Seedcorn maggot, Chinch bugs (early infestations), Flea beetles   | Do <b>not</b> make in-furrow applications. The herbicides Accent or Beacon, when used following Thimet application, may cause crop injury. Do not exceed 6.5 pounds of Thimet per acre for any row spacing.   |
| Counter CR (20G) (terbufos) | 6 oz (6.5 lb)  | 6 oz (5.2 lb)                    | Flea beetles, Corn rootworms, Chinch bugs (moderate infestations only), Billbugs, Seedcorn maggots, Wireworms, White grubs, Cutworms and Lesser corn-stalk borers (suppression) | Do <b>not</b> use the herbicides Basis or Basis Gold when Counter CR has been applied. Do <b>not</b> use in-furrow applications of Counter CR if sulfonylurea herbicides (e.g., Accent, Beacon) are used. See herbicide label for specific instructions and precautions.      |
| Force 1.5G (tefluthrin)     | 8-10 oz (8.7-10.9 lb)  | 8-10 oz (6.9-8.6 lb)             | Corn rootworm, Cutworms, Seedcorn maggot, White grubs, Wireworms, Chinch bugs (suppression), Billbugs (suppression), Lesser corn stalk borer                                    | Apply higher rate (10 oz, 1.5G; 5 oz, 3G) for severe infestations of white grubs. For best wireworm control, use in-furrow application. For chinch bug, make banded or T-banded application.  |
| Force 3G (tefluthrin)       | 4-5 oz (4.4-5.4 lb)  | 4-5 oz (3.4-4.3 lb)              |   |   |

<sup>1</sup> Numbers in ( ) represent pounds or pints of formulated product per acre when applied on 7-inch band unless specified otherwise. Where a rate range is given, the lowest rate is usually the standard, and the higher rates are used for special problems or situations.

<sup>2</sup> Based on product labels. Some minor pests that are on the labels have been omitted.

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This information is given here for educational purposes only. Reference to commercial products or trade names is made with the understanding that no discrimination is intended of other products that also may be suitable.

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