

2009 Corn Insect Control Recommendations

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Insects rob Tennessee corn producers of about five percent of their potential yields on an annual basis. However, severe pest infestations can cause complete crop loss. While pesticides play an important role in crop protection, they should be used only when there is the potential for damage severe enough to cause economic loss. There are several cultural practices that can be used to reduce insect problems and minimize pesticide use. Scouting fields for insect infestations and monitoring pest populations with pheromone traps can provide an estimate of insect pressure in a field, and thus, help to guide any treatment decisions.

Prevention

Early Planting: Planting field corn early, during the recommended planting window, will reduce the chances of crop damage from several insect species. For example, corn borers and fall armyworm are frequent pests of late-planted corn in Tennessee.

Weed Control: Certain insects carry (or transmit) virus diseases in corn. By controlling weeds such as Johnsongrass early in the season, the chances of leafhoppers and aphids transmitting viruses to corn are reduced. When planting corn in fields known to be heavily infested with Johnsongrass, choose a hybrid with good tolerance to the Maize Dwarf Mosaic Virus (MDMV) complex.

Tillage: No-tillage production systems can add to insect pest problems in many cases. Cutworms, wireworms, white grubs, seedcorn maggots and lesser cornstalk borers may build up in grass sod or where previous crop residue has been left on the soil surface at planting. Burndown with herbicides well in advance of planting (3-4 weeks) can reduce the risks of infestation.

Soil Inspection Before Planting: Look for white grubs, wireworms and any other insects that may be exposed during land preparation.

At-Planting Insecticides (Including Insecticide Seed Treatments): Insecticides can be used at planting to prevent attacks by various insect pests and should be considered when using reduced tillage production systems. Insect pests such as seedcorn maggots, cutworms and white grubs may be more prevalent in fields with crop residue on the surface at planting time. The efficacy of insecticide treatments varies depending upon the rate used and the pest species. At-planting applications and seed treatments can adequately reduce pest infestations. However, some method of incorporation may be necessary with certain liquid or granular insecticides to prevent cutworm and wireworm damage. This insures that the material being used will present a barrier to the insect, protecting the plant.

Consider using at-planting insecticides when:

- Field is no-till or reduced-till.
- You have had previous soil insect problems.
- Planting in a field that was previously sod or small grains.
- Soil has high organic matter following extended wet periods.

Scouting Corn

Seedling Corn: Check twice weekly for cutworms, seedcorn maggots, armyworms, white grubs and other pests of seedling corn. Walk in a zigzag pattern through the field, checking at least 10 places in the field. Count the number of damaged plants in 10 feet of row. Check at least 100 plants. Look for silken tubes at the bases of plants for lesser corn stalk borers. Plants less than 12 inches tall are most susceptible to injury.

Whorl-Feeding Insects: Corn fields should be checked at least weekly until the crop is mature to determine the presence of insect pests or their damage. Walk in a U-shaped pattern over the field. Sample 10 plants in 10 locations on a weekly basis, but fewer plants can often be checked depending upon pest density. To check

for live larvae, cut open at least two (or more) plants in each sample and record the number of larvae.

Look on the undersides of leaves for fall armyworm or corn borer egg masses. Southwestern and European corn borers lay their eggs in an overlapping pattern that appears as small fish scales. However, southwestern corn borer egg masses are usually smaller (2-8 eggs) than those of European corn borer (10 or more eggs). Fall armyworms lay their eggs in clusters of 50 to several hundred on corn leaves and other vegetation.

Silking/Tasseling Stages: Examine plants for European and southwestern corn borers. Look for egg masses or small larvae feeding on the leaves. Corn borers lay their egg masses on the middle third of the plant near the ear zone. Check on the undersides of leaves for these egg masses. Small larvae may be found between ear husks or behind leaf collars. It is important to correctly identify larvae which are found because corn borers, corn earworm and fall armyworm may all be present. Treatment for insect pests during this stage will be more difficult. Insecticidal control for corn borers in tasseling corn is generally not as efficient as for plants in the whorl stage. Small larvae are more easily controlled than larger worms.

Black Light and Pheromone Traps: Black light traps can be used to monitor movement of adult insects. Pheromone (sex-attractant) traps are also used to monitor various insect flights, such as southwestern corn borers. Light or pheromone traps can be used to complement an effective scouting program. Traps can be used in each county or on individual farms to provide producers with advance warnings of insect infestations.

Bt Corn Traits: YieldGard Corn Borer and Herculex I hybrids express a protein that is highly effective in controlling European and southwestern corn borer. These traits are typically recommended on at least part of a grower's acreage and particularly in late planted fields. YieldGard Rootworm and Herculex RW hybrids express a protein that controls western and northern corn rootworm. These are uncommon pests in Tennessee, and Bt traits for corn rootworm control are seldom recommended. However, continuous corn production increases the likelihood of western corn rootworm infestations. YieldGard VT Triple, YieldGard VT Triple Pro and Herculex XTRA contain Bt traits for control of both corn borers and corn rootworms. Resistance management guidelines for Bt corn require a producer to plant a refuge of non-Bt corn. Please refer to the grower licensing agreement and refuge guidelines provided by the company for complete details.

When to Treat

Seedling Plants

- **Seed or Root Feeding Insects:** Only at-planting insecticide treatments are effective in controlling infestations of seedcorn maggots, wireworms, white grubs and southern corn rootworms. Fields with prior infestations or no-till or minimum-till plantings are more likely to benefit from an at-planting insecticide for the prevention of these insect pests. This is strongly recommended for fields that were in pasture, CRP or fallow the previous year. Bt corn with rootworm resistance (see above) will provide effective control of western corn rootworm but has no effect on other seed or root feeding insects.
- **Armyworm (True):** Treatment may be necessary when one worm is found on 25 percent of the plants checked.
- **Fall Armyworm:** Treat when 50 percent of the plants have one or more larvae per plant.
- **Flea Beetles:** Treat when 75 percent of the plants show obvious scarring by beetles on stems and leaves.
- **Cutworms:** Treat when larvae are present and 5 percent or more of plants are damaged or when two worms per 100 plants are present
- **Sugarcane Beetles:** The sugarcane beetle is an occasional pest of seedling corn, feeding on roots and reducing plant stands. Although few insecticides are labeled for this pest in field corn, some at-planting insecticides (including seed treatments) may help to suppress pest populations. Rescue treatments of Lorsban 4E or pyrethroid insecticides may provide some control and are recommended when 10 percent of the stand is lost or badly damaged. See publication SP341-Q for additional information.
- **Stink Bugs:** The growing point of small plants can be damaged by stink bug feeding resulting in irregular growth. Treat corn less than 24 inches tall if 10% or more of plants are infested with stink bugs. Some at-planting insecticides and seed treatments may suppress stink bug feeding on seedling corn.

Whorl-Stage or Larger Plants

- **Fall Armyworm and Corn Earworm:** These are two “budworms” commonly found in Tennessee field corn. Controls should be initiated when 75 percent of whorls have larvae present. Control of larvae in ears is not economically practical in field corn.
- **European Corn Borer:** Treat when 50 percent of the plants are infested or when one egg mass is found per plant. Use at least 20 gallons of water per acre for treating whorl-feeding insects. Direct the coarse spray down into the whorls for most effective control. Bt hybrids with corn borer protection provide a high level of control for this pest.
- **Southwestern Corn Borer:** Treat when 20-30 percent or more of plants are found with live larvae. Bt hybrids with corn borer protection provide a high level of control for this pest.
- **Japanese Beetles:** No formal thresholds have been established. Control may be needed if beetles are clipping silks on most ears.
- **Stink Bugs:** Before silking, small developing ears ($\frac{1}{2}$ - $\frac{3}{4}$ inches long) can be damaged by stink bug feeding resulting in malformed ear development. Treat corn if 10% or more of plants are infested with stink bugs at or shortly before ear shoots appear (about V15). Do not treat stink bug infestations once silking has begun.

| Recommended Chemical Controls for Corn Insects | | | |
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| Insect | Insecticide | Product Rate/Acre (Unless Specified) | Pre-Harvest Interval (Days) And Comments |
| Seedcorn Maggot | bifenthrin (Brigade 2E, Discipline 2E) | 0.15 - 0.3 oz/1000 row ft | At-planting |
| | chlorpyrifos (Lorsban 15G)* | 8 oz/1000 row ft | At-planting |
| | clothianidin (Poncho 600) | 1.13 - 5.64 oz/80K kernels | Through seed company only |
| | terbufos (Counter CR)* | 6 oz/1000 row ft | At-planting |
| | thiamethoxam (Cruiser 5) | 0.565 - 3.62 oz/80K kernels | Through seed company only |
| | cyfluthrin, tebufirimphos (Aztec 2.1G) | 6.7 oz/1000 row ft | At-planting |
| Corn Rootworm | λ -cyhalothrin (Force 3G) | 4 - 5 oz/1000 row ft | At-planting |
| | bifenthrin (Brigade 2E, Discipline 2E) | 0.3 oz/1000 row ft | At-planting |
| | chlorpyrifos (Lorsban 15G)* | 8 oz/1000 row ft | At-planting |
| | clothianidin (Poncho 600) | 5.64 oz/80K kernels | Through seed company only |
| | terbufos (Counter CR)* | 6 oz/1000 row ft | At-planting |
| | thiamethoxam (Cruiser 5) | 5.65 oz/80K kernels | Through seed company only |
| Wireworms | cyfluthrin, tebufirimphos (Aztec 2.1G) | 6.7 oz/1000 row ft | At-planting |
| | λ -cyhalothrin (Force 3G) | 4 - 5 oz/1000 row ft | At-planting |
| | bifenthrin (Brigade 2E, Discipline 2E) | 0.15 - 0.3 oz/1000 row ft | At-planting |
| Wireworms | chlorpyrifos (Lorsban 15G)* | 8 - 12 oz/1000 row ft | In-furrow for best control |
| | clothianidin (Poncho 600) | 1.13 - 5.64 oz/80K kernels | Through seed company only |

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| | terbufos (Counter CR)* | 6 oz/1000 row ft | At-planting |
| | thiamethoxam (Cruiser 5) | 0.565 - 3.62 oz/80K kernels | Through seed company only |
| | cyfluthrin, tebufirimphos (Aztec 2.1G) | 6.7 oz/1000 row ft | At-planting |
| | λ -cyhalothrin (Force 3G) | 4 - 5 oz/1000 row ft | In-furrow for best control |
| White Grubs | bifenthrin (Brigade 2E, Discipline 2E) | 0.15 - 0.3 oz/1000 row ft | At-planting |
| | chlorpyrifos (Lorsban 15G)* | 8 - 12 oz/1000 row ft | In-furrow for best control |
| | clothianidin (Poncho 600) | 1.13 - 5.64 oz/80K kernels | Through seed company only |
| | terbufos (Counter CR)* | 6 oz/1000 row ft | At-planting |
| | thiamethoxam (Cruiser 5) | 0.565 - 3.62 oz/80K kernels | Through seed company only |
| | cyfluthrin, tebufirimphos (Aztec 2.1G) | 6.7 oz/1000 row ft | Band and incorporate |
| | λ -cyhalothrin (Force 3G) | 4 - 5 oz/1000 row ft | In-furrow for best control |
| Cutworms | bifenthrin (Brigade 2E, Discipline 2E) | 0.15 - 0.3 oz/1000 row ft | At-planting, T-band |
| | bifenthrin (Brigade 2E, Discipline 2E) | 2.1 - 6.4 oz | Foliar application, 30 |
| | carbaryl (Sevin XLR Plus 4) | 2 - 6 qt | 0 |
| | chlorpyrifos (Lorsban 15G)* | 8 - 12 oz/1000 row ft | At-planting (see label) |
| | chlorpyrifos (Lorsban 4E)* | 2 - 4 pt | Foliar application, 35 |
| | clothianidin (Poncho 600) | 5.64 oz/80K kernels | Through seed company only |
| | esfenvalerate (Asana XL 0.66E) | 5.8 - 9.6 oz | 21 |
| | methoxyfenozide (Intrepid 2F) | 4-8 oz/acre | 21 |
| | permethrin (Pounce 3.2E) | 4 - 8 oz | 30 |
| | β -cyfluthrin (Baythroid XL 1) | 0.8 - 1.6 oz | 21 |
| | cyfluthrin, tebufirimphos (Aztec 2.1G) | 6.7 oz/1000 row ft | At-planting |
| | γ -cyhalothrin (Prolex 1.25E) | 0.77 - 1.28 oz | 21 |
| | λ -cyhalothrin (Force 3G) | 4 - 5 oz/1000 row ft | At-planting |
| | λ -cyhalothrin (Karate 2.08, Warrior II) | 0.96 - 1.6 oz | 21 |
| | Z-cypermethrin (Mustang Max 0.8E) | 1.28 - 2.8 oz | 30 grain, 60 forage |
| Armyworm (True) | bifenthrin (Brigade 2E, Discipline 2E) | 2.1 - 6.4 oz | 30 |
| | carbaryl (Sevin XLR Plus 4) | 1 - 2 qt | 0 |
| | chlorpyrifos (Lorsban 4E)* | 1 - 2 pt | 35 |
| | esfenvalerate (Asana XL 0.66E) | 5.8 - 9.6 oz | 21 |
| | methomyl (Lannate LV 2.4)* | 0.75 - 1 pt | 3 |
| | methoxyfenozide (Intrepid 2F) | 4 - 8 oz | 21 |
| | methyl parathion 4 (Methyl 4E) | 0.5 pt | 12 |
| | permethrin (Pounce 3.2E) | 4 - 8 oz | 30 |

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| | spinosad (Tracer 4SC) | 1 - 3 oz | 1 grain, 7 forage |
| | β -cyfluthrin (Baythroid XL 1) | 1.6 - 2.8 oz | 21 |
| | γ -cyhalothrin (Prolex 1.25E) | 1.02 - 1.54 oz | 21 |
| | λ -cyhalothrin (Karate 2.08, Warrior II) | 1.28 - 1.92 oz | 21 |
| | Z-cypermethrin (Mustang Max 0.8E) | 3.2 - 4.0 oz | 30 grain, 60 forage |
| Fall Armyworm | bifenthrin (Brigade 2E, Discipline 2E) | 2.1 - 6.4 oz | 30 |
| | carbaryl (Sevin XLR Plus 4) | 1 - 2 qt | 0 |
| | chlorpyrifos (Lorsban 4E)* | 1 - 2 pt | 35 |
| | methomyl (Lannate LV 2.4)* | 0.75 - 1 pt | 3 |
| | methoxyfenozide (Intrepid 2F) | 4-8 oz | 21 |
| | methyl parathion 4 (Methyl 4E) | 0.5 pt | 12 |
| | permethrin (Pounce 3.2E) | 4 - 8 oz | 30 |
| | spinosad (Tracer 4SC) | 1 - 3 oz | 1 grain, 7 forage |
| | β -cyfluthrin (Baythroid XL 1) | 2.8 oz | 21 |
| | γ -cyhalothrin (Prolex 1.25E) | 1.02 - 1.54 oz | 21 |
| | λ -cyhalothrin (Karate 2.08, Warrior II) | 1.28 - 1.92 oz | 21 |
| | Z-cypermethrin (Mustang Max 0.8E) | 3.2 - 4.0 oz | 30 grain, 60 forage |
| Corn Earworm | bifenthrin (Brigade 2E, Discipline 2E) | 2.1 - 6.4 oz | 30 |
| | carbaryl (Sevin XLR Plus 4) | 1 - 2 qt | 0 |
| | chlorpyrifos (Lorsban 4E)* | 1.5 - 2 pt | 35 |
| | esfenvalerate (Asana XL 0.66E) | 5.8 - 9.6 oz | 21 |
| | flubendiamide (Belt 4) | 2 - 3 oz | 28 |
| | methomyl (Lannate LV 2.4)* | 0.75 - 1 pt | 3 |
| | permethrin (Pounce 3.2E) | 4 - 8 oz | 30 |
| | spinosad (Tracer 4SC) | 1 - 3 oz | 1 grain, 7 forage |
| | β -cyfluthrin (Baythroid XL 1) | 1.6 - 2.8 oz | 21 |
| | γ -cyhalothrin (Prolex 1.25E) | 0.77 - 1.28 oz | 21 |
| | λ -cyhalothrin (Karate 2.08, Warrior II) | 0.96 - 1.6 oz | 21 |
| | Z-cypermethrin (Mustang Max 0.8E) | 1.76 - 4.0 oz | 30 grain, 60 forage |
| Southwestern and European Corn Borer | bifenthrin (Brigade 2E, Discipline 2E) | 2.1 - 6.4 oz | 30 |
| | carbaryl (Sevin XLR Plus 4) | 1.5 - 2 qt | 0 |
| | carbofuran (Furadan 4F) | 1.5 - 2 pt | 30 |
| | esfenvalerate (Asana XL 0.66E) | 7.8 - 9.6 oz | 21 |
| | flubendiamide (Belt 4) | 2 - 3 oz | 28 |
| | methoxyfenozide (Intrepid 2F) | 4 - 8 oz | 21 |
| | permethrin (Pounce 3.2E) | 4 - 8 oz | 30 |

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| | spinosad (Tracer 4SC) | 2 - 3 oz | 1 grain, 7 forage |
| | β-cyfluthrin (Baythroid XL 1) | 1.6 - 2.8 oz | 21 |
| | γ-cyhalothrin (Prolex 1.25E) | 1.02 - 1.54 oz | 21 |
| | λ-cyhalothrin (Karate 2.08, Warrior II) | 1.28 - 1.92 oz | 21 |
| | Z-cypermethrin (Mustang Max 0.8E) | 2.72 - 4.0 oz | 30 grain, 60 forage |
| Flea Beetles | bifenthrin (Brigade 2E, Discipline 2E) | 2.1 - 6.4 oz | 30 |
| | carbaryl (Sevin XLR Plus 4) | 1 - 2 qt | 0 |
| | chlorpyrifos (Lorsban 4E)* | 2 - 3 pt | 35 |
| | esfenvalerate (Asana XL 0.66E) | 5.8 - 9.6 oz | 21 |
| | permethrin (Pounce 3.2E) | 4 - 8 oz | 30 |
| | β-cyfluthrin (Baythroid XL 1) | 0.8 – 1.6 oz | 21 |
| | γ-cyhalothrin (Prolex 1.25E) | 1.02 - 1.54 oz | 21 |
| | λ-cyhalothrin (Karate 2.08, Warrior II) | 1.28 - 1.92 oz | 21 |
| | Z-cypermethrin (Mustang Max 0.8E) | 2.72 - 4.0 oz | 30 grain, 60 forage |
| Stink Bugs | bifenthrin (Brigade 2E, Discipline 2E) | 2.1 - 6.4 oz | 30 |
| | carbaryl (Sevin XLR Plus 4) | 1 - 2 qt | 0 |
| | methyl parathion 4 (Methyl 4E) | 8 - 16 oz | 12 |
| | β-cyfluthrin (Baythroid XL 1) | 1.6 - 2.8 oz | 21 |
| | γ-cyhalothrin (Prolex 1.25E) | 1.02 - 1.54 oz | 21 |
| | λ-cyhalothrin (Karate 2.08, Warrior II) | 1.28 - 1.92 oz | 21 |
| | Z-cypermethrin (Mustang Max 0.8E) | 2.72 - 4.0 oz | 30 grain, 60 forage |
| Japanese Beetle | bifenthrin (Brigade 2E, Discipline 2E) | 2.1 - 6.4 oz | 30 |
| | carbaryl (Sevin XLR Plus 4) | 1 - 2 qt | 0 |
| | β-cyfluthrin (Baythroid XL 1) | 1.6 - 2.8 oz | 21 |
| | γ-cyhalothrin (Prolex 1.25E) | 1.02 - 1.54 oz | 21 |
| | λ-cyhalothrin (Karate 2.08, Warrior II) | 1.28 - 1.92 oz | 21 |
| | Z-cypermethrin (Mustang Max 0.8E) | 2.72 - 4.0 oz | 30 grain, 60 forage |
| Grasshoppers | bifenthrin (Brigade 2E, Discipline 2E) | 2.1 - 6.4 oz | 30 |
| | carbofuran (Furadan 4F) | ¼ - ½ pt | 30 |
| | chlorpyrifos (Lorsban 4E)* | ½ - 1 pt | 35 |
| | esfenvalerate (Asana XL 0.66E) | 5.8 - 9.6 oz | 21 |
| | β-cyfluthrin (Baythroid XL 1) | 2.1 - 2.8 oz | 21 |
| | γ-cyhalothrin (Prolex 1.25E) | 1.02 - 1.54 oz | 21 |
| | λ-cyhalothrin (Karate 2.08, Warrior II) | 1.28 - 1.92 oz | 21 |
| | Z-cypermethrin (Mustang Max 0.8E) | 2.72 - 4.0 oz | 30 grain, 60 forage |

*Caution: When using organophosphate insecticides such as Lorsban or Lannate with ALS herbicides such as Accent, Steadfast, Lightning, Option or Resolve, the possibility for plant injury exists. See herbicide label for restrictions.

Premixed Insecticide Products

The following products are available as premixes of two insecticides. The use of these premixes may provide suppression or control of multiple pests, and thus, are typically recommended when several pests are present at treatment level.

| Trade Name (Insecticides) | Amount Product per Acre | Comments and Primary Target Pests (see label for other pests that may be controlled) |
|---|--------------------------------|---|
| Cobalt (chlorpyrifos, γ -cyhalothrin)* | 3.8 oz/1000 row ft | At-plant T-band, Incorporated; Cutworms, white grubs, seedcorn maggot, wireworms |
| Cobalt (chlorpyrifos, γ -cyhalothrin) | See label | Foliar applications; Corn earworm, stink bugs, Japanese beetle, corn borers; Pre-harvest interval - 21 days grain, 14 days forage |
| Hero 1.24 (bifenthrin, Z-cypermethrin) | 4.0 - 10.3 oz | Corn borers, stink bugs, corn earworm; Pre-harvest interval - 30 days grain, 60 days forage |

*Caution: When using Cobalt with ALS herbicides such as Accent, Steadfast, Lightning, Option or Resolve, the possibility for plant injury exists. See herbicide label for restrictions.