

## INSECT CONTROL IN FIELD CORN

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Field corn in Georgia is subject to attack by many different kinds of insect pests. Some of these insects are capable of completely destroying a corn crop. However, there is no key insect pest of corn in Georgia causing serious damage in most fields every year. Indeed, in many years most corn fields may completely escape serious insect damage.

Corn is sensitive to plant population. As little as a 10% loss in stand will reduce yield potential. Consequently, insect management in corn focuses more on seedling insect pests causing stand loss than in other crops. Once corn plants are established and past the seedling stage (6+ leaf stage), corn is quite tolerant of insect injury. Corn can tolerate considerable leaf defoliation and some ear and kernel damage before significant yield loss occurs. Therefore, insecticide use in field corn in Georgia historically has been limited and aimed mostly at soil and seedling pests.

Insect pest management in field corn consists of two approaches: **(1) prevention** of insect damage by crop management and preventive insecticide use in high-risk situations and **(2) regular monitoring** of the insect-pest infestations and treatment on a field by field basis as needed after plants have emerged. Historically low commodity prices for corn made routine preventive use of insecticides in Georgia a questionable practice. However, recent robust grain prices and availability of low cost seed treatments make active pest management with insecticides more beneficial.

Certain crop management practices can help to minimize or prevent damage by some insects in field corn.

**Good Soil Conditions:** Good fertility, optimum soil pH, good field drainage, irrigation and other agronomic practices that promote rapid stand establishment and vigorous plant growth are important in minimizing losses from insect injury.

**Crop Rotation:** In general, rotation of corn with other summer crops helps prevent the buildup of corn pests from year to year. Most corn insect pests are highly mobile and therefore are not affected by rotation. However, billbug and western corn rootworm can be controlled by crop rotation.

**Plant at the recommended time:** Plantings of field corn at the recommended time often escape serious damage by most insects.

**Control Certain Weeds:** Nutsedge, bahiagrass, and johnsongrass may enhance infestations by certain insects.

**Tillage:** Reduced-tillage production, previous-crop residue, sod, winter cover crop and/or heavy weed populations increases the risk of damage by soil insects. Soil insects attacking seedlings usually are worse in reduced, strip-till and no-tillage production, where residue from previous

crops, cover crops or weeds remains on the soil surface. Conventionally-tilled fields following winter cover crops or winter weeds should be fallowed for at least 2 weeks before planting.

**Hybrid Selection.** A vigorous well-adapted hybrid will help corn tolerate injury by insects. Since 1998, hybrids containing the toxin from *Bacillus thuringiensis* (Bt) have been available. Different types of Bt traits are now available for control of either larvae of certain moth species or mid-season corn rootworms.

**YieldGard Corn borer (YGCB)** can contain the same gene (Cry1Ab) with either the MON810 event or the Bt11 event. YGCB targets caterpillar pests including European and southwestern corn borers, fall armyworm, corn earworm and other lepidopterans. The toxin is expressed season-long throughout the plant although expression may be limited in seedlings.

**Herculex I** contains the gene Cry1F. It also targets caterpillar pests including European and southwestern corn borers, fall armyworm, corn earworm and other lepidopterans. The toxin is expressed season-long throughout the plant. Activity in seedling and whorl-stage plants is greater than YGCB. Conversely Herculex I provide little protection in ears and kernels is against corn earworm damage.

**YieldGard VT PRO (YGPRO)** contains two traits, the same one in YGCB plus a new trait. The combined traits provide good control of stalk borers and fall armyworm in the whorl, but also provides good levels of control of corn earworm in the ear. YGPRO is new for 2009 and will only be available on a limited basis in a few hybrids. YGPRO has a 20% non-Bt refuge requirement.

The following table shows a comparison of activity of Bt caterpillar traits against major pests in Georgia:

<b>Bt corn type</b>	<b>Corn borers in stalk</b>	<b>Cutworm on Seedling</b>	<b>LCSB*: Seedling</b>	<b>Fall armyworm in whorl</b>	<b>Corn earworm in ears</b>
<b>YieldGard - Corn Borer</b>	Excellent	Poor	Poor-Fair	Fair	Fair
<b>Herculex I</b>	Excellent	Good	Good-Excellent	Very Good	Poor
<b>YieldGard VT PRO</b>	Excellent	Good	Not known	Very Good	Very Good

\*Lesser cornstalk borer is not specifically listed as a target pest on the Bt label.

**When to Use Bt Hybrids for Caterpillar Control:** Hybrids with caterpillar Bt traits should be considered for planting when the planting time is 1 month or more after the recommended planting time when risk of caterpillar damage is greatest. Use of Bt corn permits planting of corn as a double-crop and at times later than previously recommended for susceptible corn. Planting corn during the recommended planting time in your area usually avoids most damage by fall armyworm, corn earworm and corn borers. Therefore, when planting during the recommended planting time, caterpillar Bt traits usually do not provide a consistent yield benefit.

Compare the agronomic performance of adapted susceptible hybrids and hybrids with Bt traits and plant the best high-yield adapted hybrid regardless of Bt traits.

**Bt Hybrid Refuge Requirements:** Refuge requirements for Bt corn for caterpillar control in cotton growing areas such as Georgia are as follows:

- YieldGard-corn borer and Herculex I can only represent up to 50% of corn on a farm. YieldGard VT PRO has a 20% non-Bt corn refuge requirement.
- A non-Bt corn refuge should be planted within ¼ to ½ mile of the Bt corn.
- YieldGard-CB cannot serve as a refuge for Herculex I corn and visa versa.
- Bt corn can be treated with insecticide except for sprayable Bt products.
- Do not mix Bt and non-Bt corn seed.
- Bt and non-Bt corn can be planted in strips of 4 or more consecutive rows. Alternate row strips are not allowed.
- Check with seed dealers for complete Bt corn refuge requirements.

**Bt Hybrids for Rootworm Control:** Bt rootworm traits target midseason rootworms. The only midseason rootworm species in Georgia is the western corn rootworm, and it currently is present in the northern two thirds of the state. Western corn rootworm is only a pest when corn is grown continuously in the same field for several years. Several types of Bt rootworm products may be available, YieldGard-rootworm, YieldGard-VT, Herculex-RW, and Agrisure RW. Each product contains a different Bt gene that is active against rootworm larvae. Rootworm Bt traits are not effective against wireworms, white grubs or southern corn rootworm in the seedling stage. Therefore hybrids with a rootworm Bt trait should be considered for where corn is grown continuously, such as in dairy operations, and western corn rootworms were present in the corn the previous year. Bt for rootworm control is NOT needed where corn is rotated annually with other crops.

**Stacked Bt Traits:** Many hybrids now contain Bt caterpillar plus herbicide tolerance or a three way stack of Bt caterpillar, Bt rootworm and herbicide tolerance. YieldGard products stalk protection, root protection and herbicide tolerance are marketed as 'Triple' or VT3 such as YieldGard VT Triple PRO. Herculex XTRA also contains Herculex caterpillar and rootworm traits along with herbicide tolerance.

## Before and At Planting

Insects that live in the soil, including wireworms, white grubs, rootworms, seedcorn maggots, whitefringed beetle larvae, lesser cornstalk borer and other, can damage corn seeds and seedlings. These insects cannot be controlled once corn seed has been planted. **Rotated, conventionally tilled corn with good weed control generally has the least risk of serious early-season insect damage**, although insect damage can still occur under these conditions. Several factors increase the risk of damage by soil insects and the need for an at-planting insecticide to prevent damage.

1. Planting continuous corn in the same field.
2. Planting in no-till or minimum-till situations (such as strip till) where residue of the previous crop remains on the soil surface.

3. Planting behind small grains, winter cover crops or sod of any type especially in reduced tillage situations.
4. Late-planting (more than 1 month after the recommended planting time).
5. Planting on light soils following periods of drought (lesser cornstalk borer).
6. When planting on heavier soils following extended wet periods.
7. Planting in fields with certain weeds. Southern corn billbug damage often is associated with nutsedge infestations and sugarcane beetle builds can up on bahiagrass. Leafhoppers and aphids serve as vectors of corn viruses from johnsongrass to field corn.

### **Insecticides for Use At-Planting:**

**Seed Treatments:** Systemic seed treatments are only available as commercial seed dealer application. In 2009, seed corn from some seed companies will be automatically treated with a systemic insecticide seed treatment. Untreated seed or seed treated with the high rate must be ordered with the seed early, usually in December of the previous year. Cost for seed treatments varies per acre between irrigated and dryland corn based on differences in seed planting rate.

Poncho (clothianidin) 250: Provides good control of most soil insects, but has variable control or not effective against corn billbug, cutworms, and stink bugs. Also provides systemic control for 2-3 weeks after planting of aphids, leafhoppers, and moderate infestations of chinch bug.

Cruiser (thiomethoxam) 250: Provides fair to good control of most soil insects, but is not effective against corn billbug, cutworms, and stink bugs. Also provides systemic control for 2-3 weeks after planting of aphids, leafhoppers, and moderate infestations of chinch bug.

Poncho 500 / Cruiser 500: Both products will be available on a limited basis at an intermediate '500' which is double the 250 rate. The 500 rate should provide more consistent control under moderate to severe infestations and also improve control of insects like stink bugs and chinch bugs where the 250 rate only provides suppression. In most situations with the exception of billbug, the 500 rate is a more cost-effective option than the 1250 rate.

Poncho 1250 / Cruiser 1250: Consider use for control of billbug and cutworms and in fields with a history of severe infestations of soil insects. Also may provide suppression of light to moderate infestations of western corn rootworm.

Imidacloprid (various brands): Available at rates of 0.16, 0.60 and 1.34 mg a.i./kernel. The low rate generally is too low for most pests in Georgia. The 0.60 mg rate is effective against wireworms, s. corn rootworm, seedcorn maggots, and usually white grubs. In most cases, Poncho or Cruiser at the equivalent rate provides control of a broader range of soil insect pests.

**Granular Insecticides:** Granular insecticides require the use of specialized application equipment. The best method where **only** wireworms, seedcorn maggots, grubs and southern corn rootworms are a problem is an in-furrow application where the label allows. For insects which feed at or near the soil surface (lesser cornstalk borer, cutworms, billbugs, sugarcane beetle) probably the best placement (where the label allows) is in a T-band or a narrow band (6 to 7

inches) behind the planter shoe and in front of the press wheel. Since labels of most at-planting insecticides specify a covered-band application, in-furrow applications are the only option in no-till plantings.

Counter (terbufos) 15G: Only available in a Lock'nLoad closed handling system. Apply as in-furrow, T-band or band. Most effective against beetle type insects; not a good choice for cutworms and lesser cornstalk borer. Counter also provides fair to good nematode suppression. **Interactions with ALS herbicides such as Accent and Option may cause severe injury.** Check herbicide product label for restrictions.

Lorsban (chlorpyrifos) 15G: Apply as a T-band or band for control of cutworms and lesser cornstalk borer. Less effective against beetle type insects, wireworms and grubs. The label states that Lorsban is compatible with ALS herbicides; see herbicide labels for restrictions.

Phorate / Thimet (phorate) 20G: Apply as T-band or band application, and do not apply in-furrow due to risk of seed injury. **Interactions with ALS herbicides may cause severe injury;** see herbicide labels for restrictions. Because of the risk of seed injury, Counter 15G is a better choice for soil insect control.

Force (tefluthrin) 3G: Apply in-furrow or band. Force is a pyrethroid insecticide and is effective against most soil insects. No systemic activity, no nematode activity and no herbicide interactions. Force tends to breakdown quickly in warm, sandy soils.

Capture (Bifenthrin) 1.15G: same comments as for Force 3G.

**Liquid injected insecticides:** Several liquid insecticides are labeled for at-planting use in corn. They should be applied in-furrow using specialized application equipment or applied in the open seed furrow using flat-fan nozzles oriented with the row. See product dealer to obtain equipment. Injection spray equipment may be difficult to use if not properly installed or under certain soil conditions.

Capture (bifenthrin) 2EC, LFR(1.5): Fair to good control of soil insects. No systemic activity or activity against nematodes.

Furadan (carbofuran) 4F, LFR: Apply in-furrow. Good to very good control of soil insects. Also has systemic activity against aphids, leafhoppers, thrips and moderate infestations of chinch bugs. Furadan also provides suppression of nematodes.

Regent (fipronil) 4SC: Apply in-furrow. Provides fair control of most soil insects. Regent has some systemic activity for control of thrips, aphids, and chinch bugs on seedlings.

Liquid fertilizers: Furadan 4F, Furadan LFR, Capture LFR, and Regent 4SC maybe be tank mixed with liquid fertilizers according to label directions. Furadan 4F should be premixed to determine compatibility. Tank mixes should be continuously agitated. Furadan and Regent should be applied in-furrow for best results.

Relative efficacy<sup>1</sup> of seed treatments and soil insecticides for at-planting use in corn.

Product <sup>2,3</sup>	Seed-corn maggot	S. Corn root-worm	Wire-worm	White Grubs	Lesser corn-stalk borer	Cut-worm	Chinch bug	Corn Bill-bug	Sugar-cane beetle
Counter 15G	++	++	++	++	-	-	-/+	+	-/+
Lorsban 15G	++	++	-/+	-/+	++	++	-	-	-
Force 3G	++	++	++	+	+	+	-	-	-/+
Capture 1.15G	++	++	++	+	+	+	-		
Capture 2EC LQ	++	++	++	+	+	++	-/+		
Furadan 4F LQ	++	++	++	+	++	+	+	+	+
Lorsban 4E LQ	++	++	-/+	-/+	++	++	+	-	-
Regent 4SC LQ	++	++	+	+	+	+	-/+	-/+	
Poncho 250 ST	++	++	+	-/+	+	-	-/+	-	-/+
Poncho 500 ST	++	++	++	+	+	-	+	-/+	-/+
Poncho 1250 ST	++	++	++	++	++	-/+	++	++	+
Cruiser 250 ST	++	++	+	-/+	+	-	-/+	-	-/+
Cruiser 500 ST	++	++	++	-/+	+	-	-/+	-/+	-/+
Cruiser 1250 ST	++	++	++	++	++	-/+	++	++	+

<sup>1</sup>Rating: - indicates poor activity; + indicates fair activity; ++ indicates good activity.

<sup>2</sup>G = granule insecticide; LQ = Products require specialized equipment for liquid injection in-furrow; ST = seed treatments, applied by seed dealers.

<sup>3</sup>Boxes shaded gray indicate the insect pest is not listed on the product label. Ratings in gray boxes are listed if data from trials is available. If gray boxes are blank, assume product is not effective against this pest.

## Seedling Stage Corn

Corn fields should be checked about 2 weeks after planting to verify that plants are emerging and to determine the kinds and numbers of insects present and initiate controls if necessary. Inspect at least 10 whole plants at each of 10 different locations for average sized fields. Sample the entire field. Yield loss occurs when as few as 10% of plants are destroyed or damage so severely as to prevent normal stalk and ear development. Look for insects around the plants, on the plants, and in the soil around the stem and roots; look for dead, dying and lodged plants. If insects are present heavy damage to the young seedlings can occur in 2 to 3 days if not controlled. Check late-planted corn very carefully for the lesser cornstalk borer by looking for larvae (usually in a silken tube) boring into the plant just at the soil line.

**Billbugs** are reddish-brown or black weevil type beetles with long curved snouts. Billbug feed at the base of the stalk just below the soil surface where they chew holes through the stem killing the growing point. The insect has one generation per year and moves by crawling. Billbugs mostly cause damage in non-rotated corn following corn, in fields next to last year's corn or in fields with heavy infestations of nutsedge. Early detection of infestations is important to prevent

serious loss. At-planting banded insecticide treatments such as Counter 15G may aid in control. Systemic seed treatments, Poncho or Cruiser, are only effective at the high (1250) rate. Foliar application of an insecticide directed at the stalk and base of the plant are most effective.

**Sugarcane beetles** are black and about ½ inch long. Like billbugs they gouge holes in the stalk just below the soil surface. Damage usually occurs over a short period of time when beetles are active. This insect can build up on bahiagrass and other grassy weeds in or near corn fields. Notes on insecticide use for billbugs also apply to sugarcane beetle, except Poncho and Cruiser at the 250 and 500 rates will provide fair and good control, respectively.

**Cutworms** are larvae of various moth species. They cut leaves and entire corn seedling off near the soil line. They typically spend the day under soil or plant residue in the field. Infestations often are associated with reduced tillage with plant residue on the soil surface and/or fields with serious weed infestations the previous year or before planting. Environmental conditions causing slow seedling growth also enhance damage by cutworms. Treat when 10% of plants are cut and worms are present. Lorsban 4E or various pyrethroid insecticides applied as a broadcast application before planting OR applied as a band over the row at planting can control cutworms. Low rate of systemic seed treatments, Poncho and Cruiser, are effective. Herculex 1 Bt technology also will suppress cutworm damage, but YieldGard - Corn borer type Bt is not effective against cutworms.

**Lesser cornstalk borer** is a larva of a moth. It prefers hot, dry conditions and conventional tillage. Late planted corn is at more risk from attack. Moths are highly attracted to burnt stubble. Larvae bore into the side of seedling plants. They live in a characteristic silken tube that will be covered with soil particles. The preferred treatment option is chlorpyrifos (Lorsban and similar products) 15G applied as a band or T-band at planting. Dry conditions and lack of moisture may limit activity. Lesser cornstalk borer is very difficult to control after plant emergence.

**Chinch bugs** are small true bugs with black and white X-patterned wings as adults. Nymphs are reddish gray with a white band across their back. Chinch bugs suck sap from roots, leaves and stems causing stunting wilting and deformation of seedling plants. Chinch bugs are favored by hot dry conditions and by reduced tillage following grassy winter crops or weeds. Vigorous corn may outgrow severe seedling injury. Treat chinch bugs when 3 to 5 bugs per plant occur on 20% of plants. Systemic seed treatments Poncho and Cruiser at the 250 rate will control low to moderate infestations although the 500 rate provides more consistent control. Large infestations may require spraying seedlings. Directed spray at the base of plants using plenty of water is recommended for chinch bug control after planting.

**Stink bugs** overwinter as adults and will feed by piercing and sucking sap from corn seedlings. Common species in Georgia are the Southern Green, Brown, and Rice stink bugs. Feeding in the seedling stage stunts and deforms developing whorls. New leaves do not expand properly and are trapped in the previous leaf causing a "buggy-whip" type damage. Stink bugs are very difficult to scout in the seedling stage. About 10% seedling damage is economically important. Most at-planting insecticides are not effective in preventing stink bug damage. Systemic seed

treatments, Poncho and Cruiser will suppress damage at the low (250) rate; the 500 rate is needed for good control.

**Thrips** are tiny black or yellow insects. They feed on leaves where they can cause discoloration of leaves of seedling plants. Unless damage is severe, plants usually grow out of this damage by the 6 leaf stage with no measurable yield loss. Systemic seed treatments, Poncho and Cruiser, at low rates provide only fair to poor control. Some foliar insecticides will aid in control thrips on seedling corn.

## Whorl Stage Corn

Once corn plants reach the 5 - 7 leaf stage they are large enough to escape damage by most seedling pests. Most insects of importance during the whorl stage defoliate the whorl and leaves. These include grasshoppers, armyworms, corn earworm, cereal leaf beetles and others. Whorl stage corn is very tolerant to defoliation. The following table may be helpful in assessing the yield loss potential from defoliation at different stages whorl development.

### Yield loss Potential in Bushels Per Acre from Defoliation.

Leaf stage	Percent leaf Area Destroyed				
	20	40	60	80	100
5	0	0	1	4	6
7	0	1	4	6	9
9	0	2	6	9	13
11	1	5	9	14	22
13	1	6	13	22	34
15	2	9	20	34	51
17	4	12	27	45	70

Source: J. van Duyn, North Carolina State University.

**Whorlworms (Fall armyworm, corn earworm, true armyworm, other armyworms)** infest whorls where they chew large holes in expanded and unfurling leaves. These caterpillars as a group are sometimes called 'budworms'. Armyworms lay masses of eggs on the leaves whereas corn earworm lays single eggs. Small larvae cause window-pane or shot-hole type injury before moving to infest the whorl. Larvae tunnel in the whorl causing large wholes to develop as the leaves unfold and expand. Control should be initiated when 30% of the plants in a field are infested and larvae are present. Use ground equipment and apply **at least** 20 gallons of finished spray per acre directed down into the whorls. Cone type nozzles producing large sized droplets will aid in control. Herculex I and YGPRO Bt traits will prevent serious damage by whorlworms. YieldGard-CB also will reduce whorl damage but is less effective under heavy infestations.

**Cereal leaf beetle** is a pest of winter small grains in the spring. Adult beetles are dark blue with reddish legs and neck. Newly emerged adults leave small grain crops as they mature and move to adjacent grass crops such as corn. Adults chew long, thin, irregular lines in leaves of seedling and whorl-stage corn. Corn fields immediately next to small grain fields are most heavily infested. Beetles typically occur along the field edge initially and often can be controlled by treating the first 50 - 100 ft of the corn field edge.

**Grasshoppers** feed on many different plants and usually are a problem in dry years. Adults are very mobile and hard to control. Nymphs should be controlled if they are causing excessive defoliation and are numerous. Reduced tillage situations tend to have greater grasshopper infestations than clean tillage fields. Grasshoppers typically occur along the field edge initially and often can be controlled by treating the first 50 - 100 ft of the corn field edge.

## **Mid-Season Stalk-Boring and Root-Feeding Insects**

**European corn borer, Southwestern corn borer and Southern cornstalk borer** are caterpillars of moths that tunnel inside corn stalks during the whorl and ear fill stages. Eggs are laid in masses on leaves. Small larvae feed in foliage before tunneling into the stalk. Once in the stalk, they cannot be controlled using insecticides. Stalk borers usually are not serious insect pests of corn in most of Georgia. The southwestern corn borer only occurs in the northwestern part of the state and can cause significant stalk damage. All three caterpillar Bt traits are very effective in controlling these insects.

**Western corn rootworm** is present in the northern two thirds of Georgia, but the insect continues to spread southward. (Note: the other major rootworm species in the Midwest, the northern corn rootworm, does not occur in Georgia). Larvae feed on root tips causing root pruning reducing root activity and yield potential. In severe cases most of the roots are destroyed causing the plants to lodge or fall over in a 'gooseneck' appearance. Western corn rootworm only feeds on corn. Adults are attracted to silks where they feed. Females lay eggs in the soil in corn fields. Eggs over winter and hatch the next year to damage the following corn crop. Therefore, western corn rootworm is **ONLY** a pest of continuous corn. Crop rotation is a very effective method for controlling this insect. Hybrids with Bt rootworm traits effectively control western corn rootworm. Bt rootworm traits require a 20% non-Bt rootworm refuge within the same field or immediately next to the Bt field. At-planting insecticides also are available for use in continuous corn fields with a history of rootworm damage, but most cannot be used on row spacings of less than 30 inches.

## **Ear Formation, Tasseling/Silking, and Kernel-fill Stages**

**Stink bugs** can cause feeding damage to small developing ears before silking. This type of feeding injury usually deforms ears into a C or boomerang shape. These ears fail to develop properly and are more susceptible to infection by corn smut fungus. Treat during the ear elongation / vegetative tassel stage (stage VT) if 1 stink bug per 2 plants is present. During pollination to blister stages (R1 – R3), stink bugs feed through the husk and damage individual kernels. Control is warranted if populations reach 1 bug per plant. Use pyrethroid insecticides if green stink bugs are prevalent. If brown stink bugs are prevalent, use methyl parathion before pollen shed (methyl parathion cannot be used during pollen shed). During pollen shed, high rates of bifenthrin or beta-cyfluthrin will provide about 75-90% control of brown stink bugs.

**Corn rootworm adults, Japanese beetles, and grasshoppers** can clip corn silks thereby interfering with pollination. Silk damage or removal by insect feeding can cause poor seed set and partially filled ears. Damage must be severe to justify control with insecticides. Insecticidal

control may be needed if: (1) most ears are infested AND (2) silks are being clipped to within ½ inch of the ear tip AND (3) 1 to 2 or more rootworm or Japanese beetles are present per ear.

**Aphids** seldom require control on field corn in Georgia. Corn leaf aphid is the most common aphid occurring on field corn in Georgia. Natural enemies such as ladybugs and parasites are usually effective in regulating them at non-damaging levels. Consider control if heavy aphid infestations occur and leaves appear to be drying and dying over large areas of the field, or aphids on the tassels and silks appear likely to interfere with pollination.

**Corn earworm and Fall armyworm** larvae feed on developing kernels on corn ears. **Corn earworm** feeding damage usually is confined to the tips of the ears. Several small larvae may infest an ear, but because larvae are cannibalistic, usually only one larva completes development per ear. Corn earworm feeding activity tends to open up the husks to provide points of entry for kernel diseases and secondary insects such as sap beetles. Later plantings have greater infestations than earlier planting. Infestations of 60 to 100% of ears can occur in some years, but yield loss from one larva per ear generally is less than 5%. In later planting infestations yield loss probably exceeds 5%, because almost every ear is infested and more than one larva per ear is common. **Fall armyworm** damage is similar to corn earworm but several fall armyworms may complete development in a single ear. Therefore damage during armyworm outbreaks can be much more severe than by corn earworm. Early-planted corn often escapes ear infestation by fall armyworm. Because larvae are protected within the husk, **using insecticides to control corn earworm and fall armyworm in the ear is not feasible in field corn.** Of the caterpillar Bt traits, only YieldGard VT PRO provides a good level of control of corn earworm in the ear. YGCB only provides partial suppression (<50%), and Herculex I is not effective in preventing kernel damage.

**Maize weevils** naturally infest corn in Georgia as corn matures in the field. Maize weevils are very small brown beetles. Larvae feed inside individual kernels and destroy the kernel contents. Maize weevil can also cause serious losses in store corn if not properly managed. Timely harvest is the most effective tool for minimizing maize weevil infestations in the field. Insecticide control before harvest is not recommended in the field. Instead corn should be treated as it is placed in storage and managed to reduce the temperature of the corn in storage.

### **Relative Efficacy of Foliar-applied Insecticides**

The following table lists the relative efficacy (1 = very good, 5 = not effective) of registered insecticides for control of insect pests after plant emergence. White boxes indicate a product the insect pest is listed on the product label, while black boxes indicate that the insect pest is not listed on the product label. Specific insecticide recommendations, rates and precautions are updated annually and are available in the Georgia Pest Management Handbook, commercial edition at: [http://department.caes.uga.edu/entomology/pmh/Com\\_Corn.pdf](http://department.caes.uga.edu/entomology/pmh/Com_Corn.pdf).

Relative efficacy of post-emergence insecticides for control of above-ground (seedling, whorl, stalk, ear) corn insect pests.

Insecticide	Fall army-worm larvae*	True army-worm larvae	Corn Billbug adults	Chinch bug	Corn earworm larvae*	Cut-worm larvae	European corn borer larvae**	Southwestern corn borer larvae**
Baythroid XL	3	1-2		3	1-2	1	3	2-3
Tombstone	3	1-2		2	1-2	1	3	2-3
Capture 2EC	2	1-2		1	1-2	1	3	2-3
Delta Gold / Decis 1.5EC	2	1-2		3	1-2	1	3	2-3
Asana XL	3	1-2		4	1-2	1	3	2-3
Proaxis	2	1-2		3	1-2	1	3	2-3
Karate Zeon	3	1-2		3	1-2	1	3	2-3
Pounce 25 WP	4	1-2			1-3	2	4	4
Mustang MAX	3	1-2		3	1-2	1	3	2-3
Sevin 80S	4	1		5	3	3-4	-	-
Furadan 4F							-	-
Lorsban 4E	2	1	s	2	3	1-3	-	-
Lannate LV	2	1			2		-	-
Intrepid 2F	2	2			3		1-2	1-2
Penncap M	4	2			3	5	5	5
Radiant 1SC	2	1			2		2-3	2-3
Tracer 4SC	3	1			2		3	3
<b>Mixtures</b>								
Consero	2	1			2	1-2	3	3
Cobalt	2	1		2	2	1	3	2-3
Hero	3	1-2		2	1-2		3	2-3

Ratings range from 1-5: 1 = Very Effective and 5 = Not Effective; 1 = Standard; 3 = Fair; 5 = Poor; (2 = very good – fair, and 4 = fair to not effective). An “s” means that the manufacturer has indicated the insecticide can suppress, but not control, the particular insect. Black boxes indicate an insect pest is not listed on the product label; white lettering in the black box indicates additional data on product efficacy in the Southeast.

\*Insecticide must be able to reach the target pests. Ratings relate to applications made to the target pest before it enters the stalk or ear.

\*\*Targeted for second generation larvae before they bore into the stalk or ear.

Relative efficacy of post-emergence insecticides for control of above-ground (seedling, whorl, stalk, ear) corn insect pests (cont.).

<b>Insecticide</b>	<b>Flea beetle (adult)</b>	<b>Grass-hopper</b>	<b>Japanese beetle, Rootworm adults</b>	<b>Lesser cornstalk borer larvae*</b>	<b>Green or Southern Green stink bug</b>	<b>Brown stink bug</b>
Baythroid XL	1-2	1-2	1-2		1-2	3 (high rate)
Tombstone	1-2	1-2	1-2		1-2	3 (high rate)
Capture 2EC	1-2	1-2	1-2		1-2	3 (high rate)
Delta Gold / Decis 1.5EC	1-2	1-2			1-2	4 (high rate)
Asana XL	2	1-2	2			
Proaxis	1-2	1-2	1		1-2	3-4 (high rate)
Karate Zeon	1-2	1-2	1	4-5	1-2	3-4 (high rate)
Pounce 25 WP						
Mustang MAX	1-2	1-2	1		1-2	4 (high rate)
Sevin 80S	1-2	3	1			
Furadan 4F		3				
Lorsban 4E	-	1-2	1-2	3	3	4
Lannate LV	-		1-2		4	4
Intrepid 2F					5	5
Penncap M		5			1	1
Radiant 1SC						
Tracer 4SC						
<b>Mixtures</b>						
Consero		1-2		s	2	3-4 (high rate)
Cobalt		3	1-2	4-5	1-2	3 (high rate)
Hero	1-2	1-2	1	s	1-2	4 (high rate)

Ratings range from 1-5: 1 = Very Effective and 5 = Not Effective; 1 = Standard; 3 = Fair; 5 = Poor; (2 = very good – fair, and 4 = fair to not effective). An “s” means that the manufacturer has indicated the insecticide can suppress, but not control, the particular insect. Black boxes indicate an insect pest is not listed on the product label; white lettering in the black box indicates additional data on product efficacy in the Southeast.

\*Insecticide must be able to reach the target pests. Ratings relate to applications made to the target pest before it enters the stalk or ear.

\*\*Targeted for second generation larvae before they bore into the stalk or ear.