

Fall Armyworm: *Spodoptera frugiperda*

Fall armyworms are occasional, late-season pests of Mississippi cotton. There are many years when it is difficult to find fall armyworms in cotton fields. However, in 1977 and 1985 much of Mississippi experienced severe outbreaks of fall armyworms and many fields suffered heavy yield reductions. Less severe outbreaks have occurred more recently. Because fall armyworm infestations are easily overlooked and because undetected infestations of fall armyworms can cause severe yield loss, scouts must remain vigilant for this pest each year.

Biology: Fall armyworms are not capable of diapausing and therefore do not normally overwinter in Mississippi. However, moths often migrate into the state from more southern regions in early spring and lay eggs on whorl-stage corn and other hosts. This insect has a number of hosts, most of which are grasses. Although cotton is not a preferred host, it is occasionally attacked. Fall armyworms are not normally found in cotton until July and August.

The moths are dimorphic. Females are large, non-descript dull grey moths, but males are light brown in color with silver markings in the wings. Eggs are deposited in masses containing from less than thirty to more than 100 eggs. The egg masses, which are normally deposited on the undersides of leaves in the lower half of the cotton canopy, hatch in two to four days. The newly hatched larvae usually consume the egg shell and then quickly move away from the site of hatching, often moving to large bolls where they initially feed on the inner portion of boll bracts before boring into the boll itself. There are usually six larval instars, and the larval stage usually lasts from 12 to 16 days. Pupation occurs in the soil and lasts from 7 to 14 days.

Recent research in Louisiana has shown that there are two 'strains' of fall armyworms, a corn strain and a rice-grass strain. The corn strain is thought to be the strain most commonly found on cotton. This may explain why there can be years when cattlemen experience heavy populations of fall armyworms in bermuda grass pastures while populations in cotton remain low. The corn strain is more tolerant to insecticides than the rice-grass strain, and this may explain, at least partially (insecticide coverage is also a big issue), why fall armyworms are much more difficult to control in cotton than in pastures.

Damage: Newly hatched fall armyworm larvae will feed on leaves, but are most commonly found feeding on the inner surface of the bracts of large bolls. They feed on the inner layers of the bract, but leave the outer epidermis intact, creating a windowpane effect. Presence of these "window panes" on boll bracts is one of the key signs used in scouting for fall armyworms. As the larvae grow, they begin feeding on the boll. Initially the feeding is confined to the surface of the boll wall, but larger larvae bore into the boll and feed on the developing lint and seed. Often the site of penetration is near the base of the boll. Large fall armyworms are capable of penetrating bolls that are quite mature; even bolls that are over 500 DD60s of age are not safe from damage by fall armyworms. Boll damage in excess of 10% is not uncommon during years of heavy fall armyworm infestations. Large larvae are also commonly found feeding in blooms, and fall armyworms will occasionally feed on squares, but this is seldom common enough to be of economic importance.

Yield Effects: Over the past five years estimated yield losses due to fall armyworms in Mississippi have been low, ranging from 0.05% to 0.45%. However, during outbreak years (1977 and 1985) yield losses as high as 300 to 500 lbs of lint per acre were sustained in individual fields.

Control: As previously mentioned, fall armyworms that occur in cotton are more tolerant to insecticides than fall armyworms that occur in bermuda grass. Moreover, because fall armyworms are normally found feeding under the bracts of large bolls in the lower half of the cotton canopy, it is difficult to obtain adequate spray coverage when treating fall armyworms in cotton. Because of these two factors, fall armyworms can be difficult to control in cotton. Control is further complicated by the difficulty of detecting fall armyworm infestations while larvae are still small and easier to control. Increasing spray volume above what would normally be used to control pests, such as plant bugs and bollworms, will usually improve fall armyworm control, but any control over 60 to 80% should be considered "good". Because fall armyworms are tolerant to the Cry 1Ac Bt toxin, they are capable of causing significant damage to transgenic Bt cotton, and Bt cotton must occasionally be treated specifically to control fall armyworms. The second generation Bt cotton, which is currently under development and contains both the Cry 1 Ac and Cry IIAb endotoxins, is much more effective against fall armyworms. Treatments recommended for control of fall armyworms are listed in Table 12. In addition, many pyrethroids will provide control of newly hatched fall armyworms, and Denim (emamectin benzoate), which received a Section 18 Emergency Exemption for use against beet armyworm and/or tobacco budworms in 2002, is also effective against fall armyworms.

Table 12: Insecticides Recommended for Control of Fall Armyworms

Insecticide	Trade Name	Lbs ai/acre
Acephate	Orthene	1.00
Indoxacarb	Steward	0.09 - 0.11
Methomyl	Lannate	0.45
Methoxyfenozide	Intrepid	0.1 to 0.16
Profenofos	Curacron	1.00
Spinosad	Tracer	0.067 - 0.089
Thiodicarb	Larvin	0.60 -0.90

Source: Cotton Insect Control Guide, 2003, Publication 343, Mississippi State University Extension Service



Fall Armyworm: Fall armyworms attack both corn and cotton, as well as a variety of other crops. They are distinguished from the other armyworms found in cotton by the presence of stiff body hairs, but beginning scouts often confuse them with bollworm/tobacco budworm.



However, a distinct inverted white "Y" shape on the head capsule of larger fall armyworm larvae helps readily distinguish them from bollworm and tobacco budworm (note that this "Y" shaped area is present on all caterpillars, but it stands out distinctly on fall armyworm because it is colored white).



Fall armyworm moths are dimorphic. Female moths are grey and unmarked



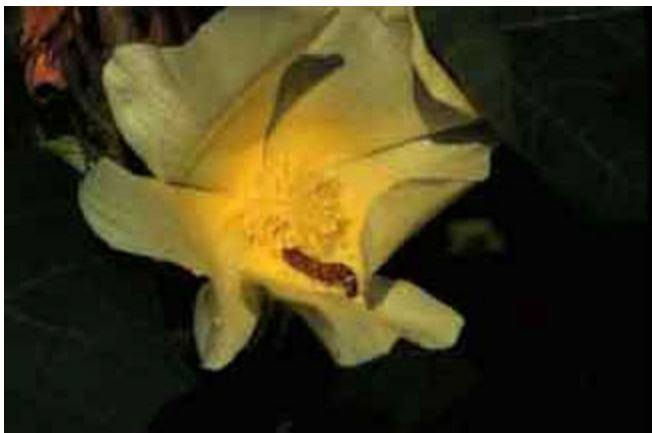
Male moths have more distinct markings



Eggs are deposited in masses. In cotton, egg masses are usually deposited on the undersides of leaves in the lower portion of the canopy, and larvae disperse from the site soon after hatching.



Small larvae are most commonly found feeding on the insides of the bracts of large bolls and this is one of the most important sites to check when scouting for this pest.



Older larvae may be found feeding or resting in open blooms.



The primary damage is inflicted by older larvae feeding in large bolls.