Fall armyworm, *Spodoptera frugiperda* (J.E. Smith)

DESCRIPTION OF INSECT

All stages except the pupae are above ground.

Eggs:

Eggs are small and circular (0.2 in) and laid in clusters of about 50-250. The eggs are initially greenish-white when first laid, but turn almost black just prior to hatching. The egg masses appear fuzzy due to scales form the female's body.

Immature stage:

Caterpillars: Larvae are green to brown to almost black. The head is dark and marked by a conspicuous yellow or white inverted "Y" on the front of the head. Unlike the black cutworm, fall armyworms have a black stripe on each side that runs the length of the body and a less prominent faint stripe that runs the length of the body down the middle of the "back". Each abdominal segment has four small, but distinct dots. When fully grown, the caterpillars range in size from just over 1 ¼ inches up to almost 2 inches long.

Pupae are about ½ inch long and reddish brown to near black. The pupae are always found in the soil.

Mature stage:

Adults are moths with a wingspan of 1 ½ inches. Front wings are mottled dark gray with light and dark markings. There is a distinct white blotch near the tip of each front wing. Markings on the male are more pronounced than the female with males having a more gray color and a light diagonal marking on the forewing, the female is more brownish. The back wings are white.

Damaging stage(s):

The caterpillars are the damaging stage and typically cause the most severe damage during the last 3-5 days prior to pupation.

Predictive models (degree day, plant phenology, threat temperatures, other)

Moths arrive from spring through mid summer depending upon location. Since this insect does not overwinter in most areas of the U.S. it is difficult to forecast its occurrence. Timing of outbreaks are influenced by migratory patterns of moths each spring.

Weekly soap flush sampling starting in late spring in the southern U.S. and mid summer in the northern U.S. is the best method to determine if fall armyworm eggs have hatched in your area.

Life cycle:

The fall armyworm has multiple generations per year depending upon the location. This insect overwinters in south Florida and along the extreme southern Gulf Coast. Each spring moths migrate north and the timing and extent of these migrations is dependent upon spring weather patterns. In the Southeast, damage may occur in May and three

or more generations may occur. Whereas in areas further north in the U.S. may not see damaging populations until August and only one generation occurs.

Females lay eggs on light-colored objects including materials, foliage of plants, flags on golf greens, fences and buildings, metal gutters, and other objects. The moths are attracted to lights and egg laying is often more common in those areas.

Eggs hatch in 2-10 days and most eggs in a mass hatch about the same time.

The small caterpillars spin down to the turf on threads and feed in the morning and early afternoon.

As the caterpillars become larger after 2-3 weeks they may feed more at night to avid predation by birds. After 3-4 weeks the caterpillars burrow into the soil to pupate.

Moths emerge from the pupae in 10-14 days.

Conducive environmental conditions:

warm, wet springs with weather fronts moving up from the South may lead to earlier outbreaks. Wet spring also appear to be detrimental to natural enemies of the fall armyworms.

Geographic distribution:

South, Central and North America

DAMAGE CAUSED:

Plants attacked:

Although bermudagrass is most commonly damaged, falll armyworms feed on most grasses. Infestations are most commonly associated with lush, green, dense grass.

Symptoms of damage:

Young larvae skeletonize the tenderest leaf tissue.

Older larvae consume most of the leaf tissue

Warm season turfgrass may take on the appearance of frost or freeze damage.

Presence of or pecking in turf by birds.

Larvae move in groups and often is definite line of damage starting at edge of turf

Damage often associated with lights.

Growing tips of cool season turf is often affected and serious damage results.

Timing of damage:

Visible damage typically begins in mid summer through fall.

Since this pest must migrate back into areas each spring there is usually no relationship between infestation from one year to the next..

Links to photographs, illustrations of damage

http://www.turffiles.ncsu.edu/news/insects/FallArmyWorm.htm

INSECT REFERENCE

Insects that look similar; Pests that cause similar damage:

Areas with a serious fall armyworm infestations may have a similar appearance to drought stress or in the case of warm season turf, may resemble frost damage. However, grub infestations are much more common in cool-season grass and much less common in warm season turf. Mole cricket damage mainly limited to sandy soils and warm season turfgrass.

Some surface-dwelling crickets look similar, but are much darker in coloration and do not have large front feet modified for digging.

MONITORING TECHNIQUES:

Fall armyworms may feed actively during the day when small, but have a tendency to be more reclusive and to avoid feeding during the day when they become larger (and more damaging). The presence of birds in a turf area may be an indicator of fall armyworm presence. Weekly soap flush sampling (see IPM Template Reference “Monitoring for insects with soap flushes”) starting in late spring in the southern U.S. and mid summer in the northern U.S. is the best method to determine if fall armyworm are present in turfgrass.

THRESHOLDS:

There are no hard and fast thresholds for this pest. Some fairways can tolerate moderate infestations, but infestations usually move in from the rough and numbers as high as 100 per square yard can occur. Cool season turf is likely to be more seriously damage. Established bermuda usually recovers, but may take several weeks for regrowth to cccur. Newly-sodded, seeded or sprigged areas are prime areas for damage.

MANAGEMENT STRATEGIES:

Watching for birds on turf, observing large numbers of moths flying around lights, and green fecal pellets in the turf can be indicators of a fall armyworm infestation. Use of soapy water flushes to confirm presence is critical. Mowing will mechanically kill some larvae. Mowing also reduces depth and thickness of turf and allows for better coverage with spray applications. Irrigation prior to treatment may stimulate caterpillars to be more active during application. Always consult the most recent version of all product labels before use.

Follow resistance management guidelines by rotating products as outlined in IPM Template Reference "Insecticide Resistance Management Groups."

Fall armyworm management strategies				
TYPE	TIMING/ THRESHOLD	PRACTICE		COMMENTS
Cultural	N/A	Mowing		
Biological	Apply when adult stage is detected, or by damage, or with soap flush	Beneficial nematode products based on *Steinernema scapterisci*. For current suppliers, see http://www.oardc.ohiostate.edu/nematodes/nematode_suppliers.htm		• Pre and post application irrigation critical • Not recommended for heavy infestations
Chemical	Apply when small larvae are first detected with soap flush for best results	**Active Ingredient (Product)**	**Label signal word**	Sprayable formulations typically outperform granular formulations Sprayable formulations typically outperform granular formulations Apply while armyworms are less than 1 inch long for best control.
		Acephate (Orthene)	Caution	
		Bifenthrin (Talstar)	Caution	
		Carbaryl (Sevin)	Warning	
		Cyfluthrin (Tempo)	Caution	
		Deltamethrin (Deltagard)	Caution	
		Indoxacarb (Provaunt)	Caution	
		Lambda cyahalothrin (Scimitar)	Caution	