

BOLL WEEVIL, *Anthonomus grandis grandis*

Historically, the boll weevil was the most important insect pest of Mississippi cotton. Boll weevil was considered a key pest of cotton, because the early season treatments that were necessary to control boll weevils destroyed beneficial insects and thus "flared" secondary pests, such as tobacco budworms and aphids.

As of the end of the 2001 growing season, statewide eradication efforts have reduced boll weevil numbers to extremely low levels, and it appears that complete eradication will be achieved within the next two years. Mississippi cotton growers no longer spray for boll weevils themselves, and only 32% of Mississippi's cotton acreage was treated by the Boll Weevil Eradication Program (BWEP) in 2001. Fifty percent of Mississippi fields remained weevil free for the entire season, and no yield loss was attributed to boll weevils in 2001. Therefore, the primary concern for Mississippi cotton with respect to the boll weevil is to successfully maintain eradication, once it is achieved. The Hill Region of Mississippi passed a 10-year eradication maintenance referendum in 2001 and the remaining two regions of the state will vote on maintenance programs during the next two years.

A successful maintenance program will require the continuation of a vigorous pheromone trapping program on all cotton in the state. This is necessary so that any re-infestations of boll weevils can be promptly detected and eliminated before they have a chance to spread. Successful eradication maintenance will also require continued education of growers and scouts, so that they will be able to recognize and promptly report the presence of boll weevils and/or boll weevil damage in their fields. Successful eradication maintenance also requires continued, ready access to insecticides that are effective against boll weevils and can be used to eliminate any re-infestations that do occur. Because of logistical, environmental, and cost considerations, Malathion ULV has been the primary insecticide used in the BWEP, but a number of other insecticides are also effective against boll weevils.

Biology: Boll weevils overwinter as adults in ground trash and leaf litter around the borders of cotton fields. Overwintered adults emerge in the spring and enter cotton fields. These adults may feed on seedling cotton plants, but cannot begin reproduction until 1/3 grown squares (squares having a floral bud diameter of at least ¼ inches) are available. Both male and female boll weevils feed on cotton squares by chewing into the square with the small mandibles that are located on the end of their long snout. After feeding, female boll weevils will usually lay a single egg into the puncture and seal the puncture with a glue-like substance. Usually only one egg is laid per square, but boll weevils will also feed upon and oviposit in bolls, which can support the development of more than one larva. Female boll weevils lay approximately 150 eggs over about a 12-day period.

Under normal summer temperatures the eggs will hatch within three to five days. The legless, grub-like larvae complete three larval instars over a seven to eleven day period. During this larval development period, infested squares are usually aborted by the plant and the latter portion of the larval stage is completed within the fallen square. However, infested bolls are not usually aborted. Pupation occurs within the square or boll in which the larva developed. The pupal

period lasts approximately four to seven days. Upon completion of the pupal stage the callow adults chew their way out of the square or boll in which they developed.

Newly emerged adults often congregate in open blooms, where they feed on pollen. Female boll weevils are able to begin laying eggs within three to five days after they emerge as adults. The average time for completion of one generation is approximately 21 days, and there are four to five generations per season. Because boll weevils have few natural enemies in Mississippi, the population increases dramatically with each generation. The shortening day lengths of late summer and early fall trigger boll weevils to enter diapause. Diapause-induced adults feed heavily on cotton during late season and then enter overwintering sites. Although most boll weevils enter overwintering sites relatively near the field in which they developed, boll weevils are capable of long-range wind assisted flight, and some boll weevils travel many dozens of miles before entering overwintering sites.

Damage: Adult boll weevils have chewing mouthparts located at the end of their long snout. Both sexes feed on squares (cotton floral buds) and bolls by chewing small holes into the fruit. Female boll weevils often deposit a single egg into the hole made by their feeding. Eggs hatch into legless larvae, which feed on the contents of the square or boll. Adult boll weevils also feed on pollen in open blooms, but this feeding does no damage. Squares are not attacked until they have attained a bud diameter of approximately $\frac{1}{4}$ inches. Feeding injury by adult boll weevils does not necessarily result in death of affected squares, but squares in which eggs are deposited are aborted by the plant once these eggs hatch and the larvae begin feeding inside the square. When they are present, squares are preferred over bolls, but bolls may sustain heavy damage during late season after square counts decline.

Yield Effects: In the absence of effective control efforts boll weevils have the ability to completely destroy a cotton crop. Historically, growers applied multiple, close interval insecticide treatments to keep boll weevil populations in check. Despite this heavy insecticide use, yield losses were still significant. Before the Boll Weevil Eradication Program was initiated in 1997 the estimated annual yield loss attributed to boll weevils ranged from 0.2% to 6.5%. Yield losses were historically higher following milder winters, which allowed higher survival of overwintering weevils. Yield losses also were historically higher in the Hill region of the state than in the Delta region and often exceeded 5% in the Hills. Beginning in 2000, and continuing into 2002, the eradication effort had reduced boll weevil populations to such low levels that no yield loss was attributed to this pest.



Boll Weevil: Proper identification of boll weevils is especially important in areas where this pest has been eradicated or in the later years of an active eradication effort. The elongated snout is one of the best known characters of the boll weevil. However, all of the members of the family *Curculionidae*, the large family of beetles which includes the boll weevil, share this character. A more distinguishing character of boll weevils is the presence of two sharp spurs on the enlarged, club-shaped segment of the front leg (below).

