ANNUAL REPORT TO COTTON INCORPORATED

MONITORING BOLLWORM AND TOBACCO BUDWORM IN TENNESSEE COTTON

Agreement No. 03-397TN
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Justification and Approach:

Despite the use of Bt-transgenic cotton on over 80% of the acreage in Tennessee, bollworm and tobacco budworm remain very important. The bollworm/budworm complex was the most destructive pest group to Tennessee cotton in 2003, causing an estimated 2.6% reduction in yield, despite some fields being treated with insecticides for these pests on multiple occasions. Bollworms caused significant economic damage to many Bt cotton fields, and the bollworm/budworm complex was even more damaging to non-Bt cotton. Resistance to pyrethroid insecticides in tobacco budworm populations makes distinguishing between budworm and bollworm infestations very critical in non-Bt cotton. Using a pyrethroid insecticide on a "worm" infestation which contains a significant percentage of tobacco budworms often results in serious economic losses.

Area-wide monitoring remains a valuable tool in predicting the occurrence and size of pest populations. Pheromone trapping programs for bollworm, tobacco budworm, and beet armyworm provide insight into the timing and intensity of moth flights. For example, unusually high trap catches for a particular species can alert consultants and producers to the potential for impending outbreaks. When performed on a regional level and over a number of years, moth trapping can indicate historical and geographical patterns in the distribution of pest populations. Moth traps are also used to collect specimens for use in vial assays to monitor insecticide resistance. Moth monitoring improves the decision making process, helping crop managers in the selection of insecticides and to indicate the need for intensified sampling efforts. This ultimately helps to minimize control costs and/or yield losses incurred by producers.

Pheromone moth traps for bollworm (CBW), tobacco budworm (TBW), and beet armyworm (BAW) were run on a weekly basis from June through early September. Traps were located in cotton growing areas of each county and were usually placed on the borders of cotton fields. All pheromone lures were obtained from Great Lakes IPM (Vestaburg, MI) and were changed weekly. One or two sets of bollworm and tobacco budworm traps were run in each of the following 12 counties in West Tennessee: Carroll, Crockett, Dyer, Fayette, Gibson, Hardeman, Haywood, Tipton, Lake, Lauderdale, Madison, and Shelby. One beet armyworm trap was located in all the above counties except Shelby.

We also offered an egg identification service to clientele groups using ELISA techniques (Hel ID Kit, Agdia Inc., http://www.agdia.com/helid/). Despite soliciting the involvement of county agents, consultants and other agricultural professional, only six egg samples were submitted in 2003.

Results, Progress, and Accomplishments:

Moth catches for each trap were reported weekly in the Tennessee IPM Newsletter, as were with the results of any egg samples which were submitted for identification using ELISA techniques. The newsletter is also posted on the internet at http://www.utcrops.com and distributed to agents, cotton producers, consultants and other agricultural business professionals.

As in 2002, corn earworm (i.e., bollworm) moths were caught more frequently than either tobacco budworm or beet armyworm. Bollworms composed 74% of all moths caught based on average trap catches made from early June through early September (Fig. 1). In contrast, tobacco budworms and beet armyworms composed about 20 and 6% of the moths caught, respectively. Only six egg samples were submitted for identification, as either bollworm or tobacco budworm, using a diagnostic ELISA kit. All samples were submitted from one of two counties, either Crockett of Madison. In every case, 100% of eggs submitted were identified as bollworm.

Moth traps indicated very low populations of beet armyworm in 2003 (Fig. 2). A seasonal average of only 1.4 moths per trapping cycle was recorded. The highest single-trap capture was 25 moths on 12 August in Lake County, and this county caught the highest average number of moths throughout the season (Fig. 3). Statewide, trap catches peaked on 5 and 12 August at an average of 6.4 and 6.7 moths per trap, respectively (Fig. 2). Infestations of beet armyworm in cotton fields were nearly non-existent in 2003, corresponding to these low trap catches.

Tobacco budworm moth catches were also low this year, averaging 4.2 moths per trapping cycle week during the season (Fig. 2). Weekly tobacco budworm moth catches peaked in late August but never exceeded 22 moths in any single trap. The highest trap catches were recorded in Lake, Lauderdale, Madison, Dyer and Shelby Counties (Fig. 4). Like the previous year, more tobacco budworm moths were caught in Lauderdale County than at other locations. As indicated by trap catches, tobacco budworm infestations in Tennessee cotton fields were very low this year.

The bollworm is Tennessee's most significant caterpillar pest in cotton because this species is able to cause economic injury to Bt cotton, which composes most of the acreage. Average moth catches were higher from late July and through August (Fig. 2) than in 2002, with a statewide peak of 45 moths per trap on 18 August. The rapid increase in bollworm trap catches after 14 July corresponded with larval maturation and subsequent immigration of moths from corn. August moth catches coincided with infestations that were commonly being observed in cotton, especially in Madison and Hardeman Counties where seasonal average trap captures exceeded 40 and 50 moths per trapping cycle, respectively (Fig. 5). The highest single trap captures were recorded in Madison (150 moths, 21 and 28 August) and Hardeman (163 moths, 21 August) Counties; however, similar numbers of moths were caught in these counties on 29 July. A late August flight of bollworm moths in these counties was evident from moth catches in pheromone traps and high egg oviposition rates in many cotton fields.

In general, pheromone moth catches did a good job of indicating the timing and intensity of bollworm, budworm and beet armyworm infestations in cotton. Trapping did not necessarily reflect all local variations in population densities observed in cotton fields, in part because trap

density was not high and because other factors influence oviposition and survival of these pests in cotton. Trapping on a more localized level, supplemented by other diagnostics techniques, is probably needed to provide crop advisors with better information to make management decisions. However, there was only limited interest by crop managers in utilizing the free egg-identification service offered by the University of Tennessee (and sponsored by Cotton Incorporated). This lack of interest is precipitated by the low percentage of non-Bt cotton which is planted within the state. The high adoption of Bt cotton reduces the need and importance of distinguishing between bollworm and tobacco budworm infestations.

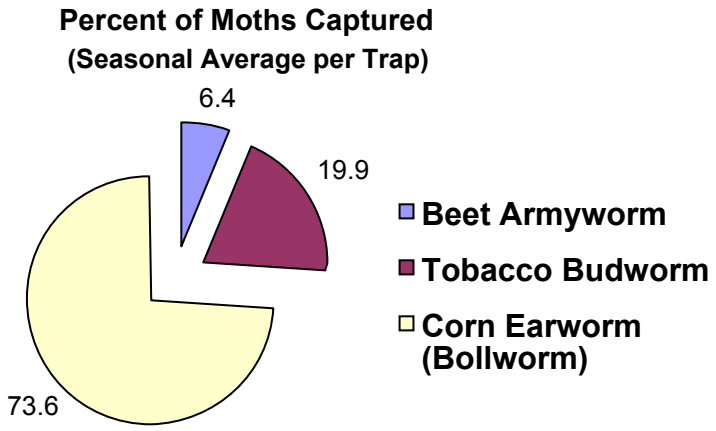

Fig. 1. Percentages of armyworm (BAW), tobacco budworm (TBW), and corn earworm (CEW) moths caught based on seasonal average catches per trap in West Tennessee during 2003.

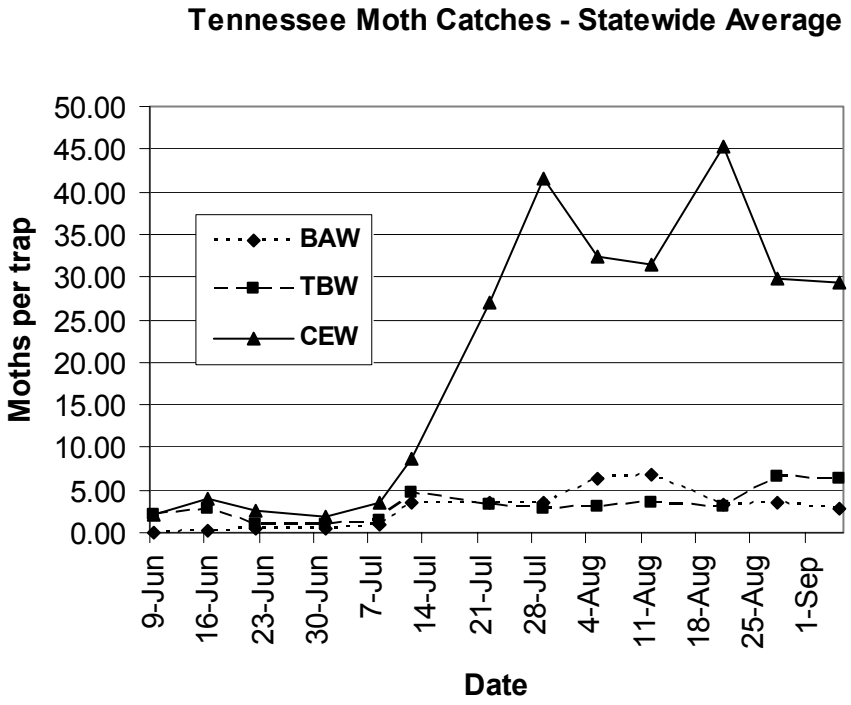

Fig. 2. Average numbers of beet armyworm (BAW), tobacco budworm and corn earworm (CEW) moths caught per trap in West Tennessee during 2003.

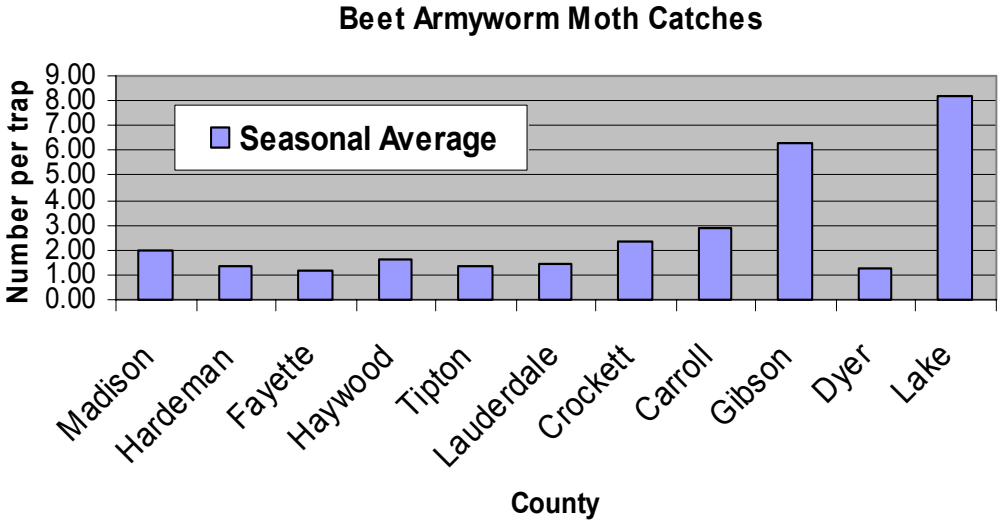

Fig. 3. Seasonal, county average number of beet armyworm moths caught per trap per trapping cycle in West Tennessee during 2003.

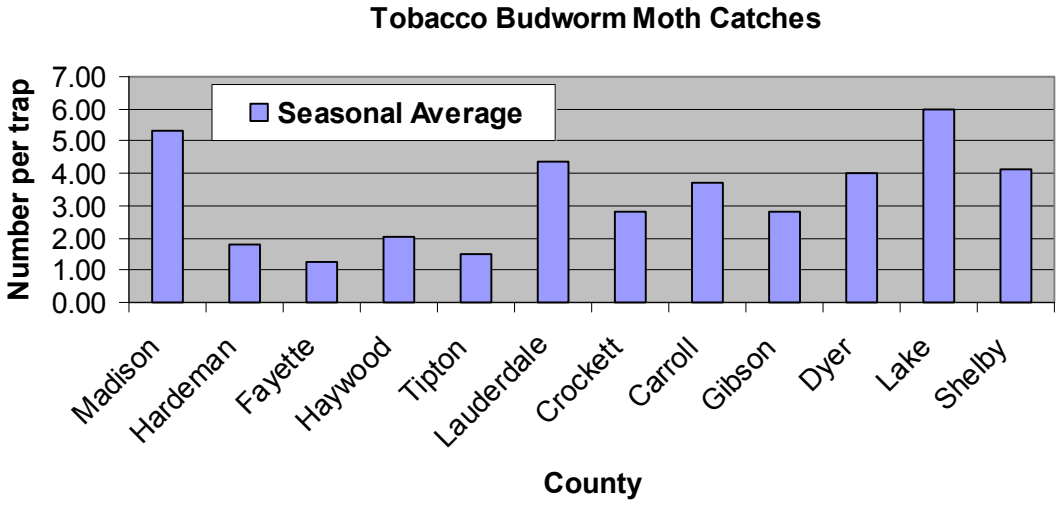

Fig. 4. Seasonal, county average number of tobacco budworm moths caught per trap per trapping cycle in West Tennessee during 2003.

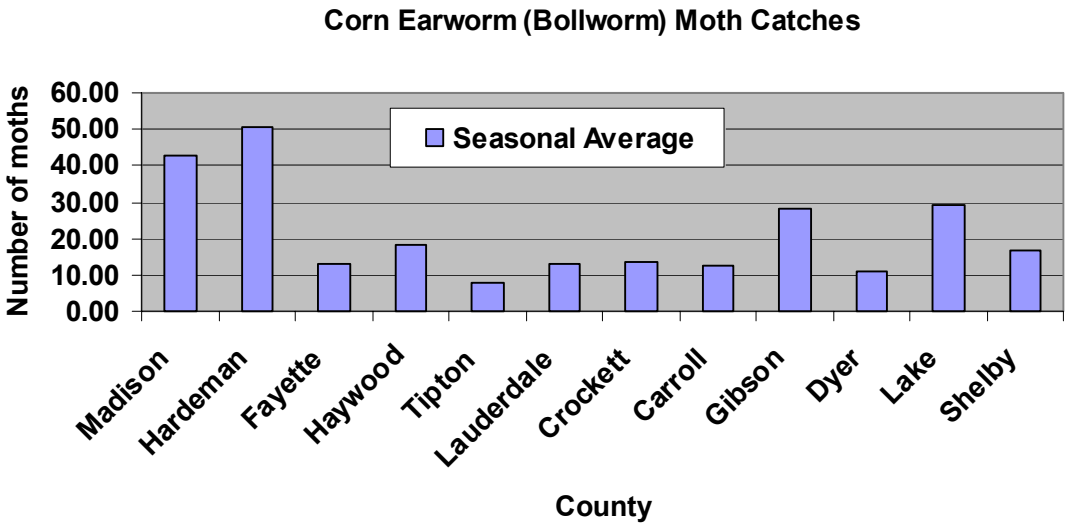

Fig. 5. Seasonal, county average number of corn earworm moths caught per trap per trapping cycle in West Tennessee during 2003.