

**Seasonal Moth Trapping for Detection of Adult Flights for Southwestern
Corn Borer, Western Bean Cutworm, and Fall Armyworm in the Texas High
Plains**

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Summary

The Moth Trapping project has been conducted during the 2011 – 2013 growing seasons from June through August to monitor the seasonal moth flights of Southwestern corn borer (SWCB), Western bean cutworm (WBC) and fall armyworm (FAW). The project has been conducted from Hale to Parmer and up to Dallam and across to Lipscomb by Texas A&M AgriLife County Extension agents. In 2013 twelve county Extension agents monitored moth activity in fourteen High Plains counties. Three pheromone bucket style traps were setup (one per pest species) in each of 27 corn producer's fields. This provided a total of 81 traps across the Texas High Plains that were used to monitor the real time abundance and flight duration of each of three moth species. Each moth species had distinctively different moth flights from each of the other two moth species. And, there was considerable variability in a moth's abundance across counties in 2013 and differences from previous years. SWCB were generally lower in 2013 compared to the previous two years (2011 and 2012). Counties with the lightest activity in 2013 were Gray, Hale, Hutchinson, Randall, Sherman, and Swisher. In contrast, Deaf Smith, Dallam, Hansford, Hartley, Moore, Parmer and Sherman counties had much heavier activity of SWCB. The SWCB flights of second generation moths occurred from July 23 to August 20. The western bean cutworm flight activity in 2013 occurred from June 25 to August 13 which was later in the season than either of the previous two years. WBC moth captures were heaviest in Dallam, Hartley, and Moore counties. WBC were monitored farther east to Ochiltree county and south in Deaf Smith and Parmer counties. Fall armyworm moths were captured in higher numbers throughout the growing season in 2013 compared to the other years, particularly in Gray, Lipscomb, Parmer, and Randall counties. County Extension Agents from Deaf Smith and Lipscomb counties continued monitoring FAW until September 24 at the request of farmers wanting more information about late season activity of FAW.

By monitoring the moth activity and reporting the findings through Texas A&M AgriLife Extension newsletters, news articles and phone contacts to producers, crop consultants, local ag suppliers, and ag-aviators, they were able to assess when infestations were a potential threat for making management decisions. From the response of farmers, crop consultants, aerial applicators and other individuals the moth trapping project is meeting a critical need for corn producers in the Texas High Plains.

Introduction

There are approximately 1 million acres of corn grown in the Texas High Plains yearly. Producers that plant non-Bt corn for refuge requirements and for human food consumption are vulnerable to heavy damage from southwestern corn borer (SWCB), western bean cutworm (WBC), and fall armyworm (FAW) infestations. Depending on the Bt-corn hybrid a producer plants, a certain percentage of the corn acreage has to be planted to non-Bt corn hybrids as a refuge to prevent these corn pests from developing resistance to the Bt corn toxins. For corn grown in cotton producing areas (south of Amarillo, TX) the refuge acreage is 20% to 50% non-Bt corn. Fields in non-cotton areas (north of Amarillo, TX) the refuge area is 5% to 20% non-Bt corn. Also, some of the Bt corn hybrids with single gene toxins do not provide 100% protection against WBC and FAW infestations resulting in corn kernels being damaged from larvae feeding in the ear. Recently, there has been an increased incidence of damage even in the Bt-Herculex corn hybrid. Some food grade corn hybrids do not have the Bt technology and if a producer selects these hybrids to plant then 100% of the corn acreage is susceptible to damage from these

pests. Therefore, if just 20% of all corn grown on the Texas High Plains there can be 200,000 acres of corn annually not protected from these corn pests.

Knowing the moth activity during the growing season is critical to making informed management decisions. The activity of these three corn pests can occur at different times and at different infestation levels depending on seasonal weather conditions. This makes it difficult for producers, crop consultants, local ag suppliers, and ag-aviators to know when there will be damaging infestations and when to make timely insecticide applications for optimum control to minimize economic losses. Therefore to assist producers, crop consultants, local ag suppliers, and ag-aviators with knowing when these pests are active, a network of Texas A&M AgriLife County Extension Agents (CEA) across the Texas High Plains was organized to monitor the moth flight activity of SWCB, WBC, and FAW.

Objective

To provide current real time information to corn producers, crop consultants, local ag suppliers, and ag-aviators throughout the Texas High Plains about the activity of Southwestern corn borer (SWCB), Western bean cutworm (WBC) and fall armyworm (FAW) moth flights during the 2012 growing season.

Method and Materials

Twelve county Extension agents setup pheromone bucket style traps in 14 Texas counties from Hale to Parmer and up to Dallam and across to Lipscomb to monitor the abundance and duration of the moth activity. A total of 81 traps (one per pest species) were setup in 27 corn producer's fields and monitored weekly from beginning June until the end of August. A spreadsheet with graphs was setup on google documents so each of the county extension agents could post data from their counties. Trap catches from each field in a county were summarized and made available weekly to producers, crop consultants, local ag suppliers, and ag-aviators through phone calls and text messages from the local county extension agents, newspaper articles, county extension agent newsletters, the Texas AgriLife Extension Panhandle Pest Update newsletters, and postings on the Texas AgriLife Extension website Insect Surveys (<http://amarillo.tamu.edu/facultystaff/ed-bynum/insects/>).

Results and Discussion

Moth Trapping

Climatic conditions change from year to year which influences the flight activity and abundance of moths. Comparing moth trap catches between 2011 to 2013 show the importance of having a monitoring system to determine moth activity of SWCB, WBC, and FAW during each year. The moth activity is really unique to a county and can be variable from year to year. In 2011, SWCB moths increased to extremely high numbers (3,000 to 5,000 per weekly trap catch) in Deaf Smith County and continued for an extended period of time from July 18 to August 29. The extended flight of SWCB moths indicated there was a 3rd generation of SWCB in 2011. In Dallam County, high numbers of SWCB moths were also trapped from July 25 to August 15 (Fig. 1). Comparatively, moderate SWCB activity was recorded in Sherman County while the remaining counties had relatively low levels of SWCB moth activity. In 2012, SWCB moth flights did not reach the high levels that were present in 2011 (Fig 2). The second

generation moth activity across the Texas High Plains was basically for July 17 to August 14. Counties with the highest numbers of SWCB moths during this time were Lipscomb, Parmer, and Dallam (Fig. 4). Dallam county had an early peak of SWCB (June 29) and Parmer county had a late flight of SWCB (Aug 28 to Sept 4). Counties with more moderate, but significant, SWCB flights were Deaf Smith, Hansford, Hutchinson, and Sherman. Counties with little or no SWCB activity were Gray, Hale, Ochiltree, Potter, Randal and Swisher. In 2013 the overall densities of SWCB moths were even lower than in 2011 and 2012 (Fig.3). Still larval infestations from moths in 2013 were high enough to cause economic losses in fields across the High Plains. Counties with the lightest activity were Gray, Hale, Hutchinson, Randall, Sherman, and Swisher. In contrast, Deaf Smith, Dallam, Hansford, Hartley, Moore, Parmer and Sherman counties had much heavier activity of SWCB.

WBC moth flight activity in 2011 was from June 14 to August 1 with predominately high numbers from June 14 to July 18 in Dallam, Hartley and Sherman counties (Fig. 4). Although moth trap catches were not extremely high in Moore County, trap catches at one location showed WBC were active the last week of June. The rest of the counties had nominal to no activity of WBC. In contrast, WBC moth activity in 2012 was predominately for June 12 to July 10, but moths continued to be activity in lower densities until August 7 (Fig. 5). This continued activity extended the application window for farmers to protect fields from larval infestations. In 2013, WBC moths captures were heaviest in Dallam, Hartley, and Moore counties (Fig.6). The flight activity of western bean cutworm moths was generally delayed until June 25 but continued until August 13.

The pheromone lure for FAW moths is not as attractive to moths as lures for SWCB and WBC. Still the lures are effective enough to show patterns of moth flights during the growing season. FAW moth activity in 2011 began with relatively high numbers as shown by trap numbers June 6 in several counties, but activity dropped to low levels until moths became active again the last of August (particularly in Lipscomb County) (Fig 7). In 2012, FAW activity was relatively low from June 5 to August 14 (Fig. 8). From August 14 to September 18, FAW moths were captured in higher numbers in Deaf Smith and Parmer counties. These trap catches in Deaf Smith and Parmer counties were extended into September at the request of farmers wanting more information about late season activity of FAW. In 2013, FAW moths were captured in high numbers in Gray, Lipscomb, Parmer, and Randall counties throughout the growing season (Fig. 9). County Extension Agents from Deaf Smith and Lipscomb counties continued monitoring FAW until September 24 to provide information about late season activity of FAW.

These moth trapping data demonstrate the variability and differences of flight patterns of the three moth species. Monitoring moth activity reveals that moth activity is different each year area wide and within the counties. As farmers extend their planting dates into June, there will be fields across the Texas High Plains that may or may not be vulnerable to egg lay and larval damage from each of these different moths. Therefore, monitoring the moth activity and reporting the findings to producers, crop consultants, local ag suppliers, and ag-aviators, they are able to assess when infestations are a potential threat and when activity is not a threat.

Impact of Moth Trapping Project

After the 2011 growing season was completed the results of the moth trapping survey project was reported to producers at several meetings sponsored by the county extension agents. These meetings were in Dalhart, Canyon, and Dumas, Stratford, Perryton, Morris, Pampa, and Hereford. These meetings increased individual awareness of the moth trapping project. At the

meetings farmers and crop consultants wanted to know if the project was going to be continued in 2013. Their comments were that they liked having the data to help them confirm what they were seeing and to know what was happening in other areas of the Texas High Plains.

During all three growing seasons the moth trapping data from weekly catches were distributed to farmers, crop consultants, and agri-business individuals through the Panhandle Pest Update newsletter to individuals on the e-mail list. County Extension agents provided the trapping data to their farmers, crop consultants, and agri-businesses by phone conversations and messages. A survey was conducted after the 2011 season to evaluate the importance of the trapping project to farmers, crop consultants, aerial applicators, and agribusinesses. From the survey, 54.5% of the respondents rated the trapping project as important and 36.4% rated the project as very important for a 90.9% satisfaction rating of the project. The trapping data was used to help determine if the moth activity of a particular species (SWCB, WBC, FAW) was a threat or not a threat from one week to the next. By knowing the moth activity, some individuals scouted fields more frequently. Individuals were able to make decisions for when to time spray applications. This survey showed that individuals used the information in making management decisions.

In 2012, farmers and consultants in Deaf Smith and Hutchinson request that their county agent increase the number of fields monitored and wanted traps on their fields. After visiting with consultants and farmers, the moth data from the trapping project was spread more by word of mouth. After each Panhandle Pest Update newsletter containing moth trapping data was e-mailed, Mr. Russell French, Pioneer seed company representative, would forward the newsletter to other farmers, crop consultants, and company representatives.

In 2013, the response from farmers and consultants has continued to be very positive. Mr. Russell French continued forwarding the Panhandle Pest Update newsletter his clientele because of the moth trapping data. From the response of farmers, crop consultants, aerial applicators and other individuals the moth trapping project is meeting a critical need to corn producers in the Texas High Plains.

