MONITORING BOLLWORM POPULATIONS IN ARKANSAS USING ARCMAP

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Abstract

The cotton bollworm (*Heliocoverpa zea*) is an important pest of cotton in Arkansas. Through federally funded grants, extension row crop entomology specialists and county agents throughout the state work together each growing season to monitor this pest using pheromone traps as part of the Arkansas Integrated Pest Management (IPM) Program. Each week of the growing season, county agents check bollworm traps that are placed across the respective counties to represent areas with potential for infestation. The number of moths found in each trap is then reported to the Arkansas IPM Program coordinator. Historically, these data have been collected and put into chart form, which is then posted on the University of Arkansas Extension website. Each county has its own bar chart that is posted each week with bollworm counts. Though effective at communicating bollworm numbers, this method is not necessarily easy to navigate or to quickly understand given the frequent need to view multiple counties. To provide a better visual, state-wide representation of bollworm populations and movement of the pest from week to week, we have begun to utilize the spatial program ArcMap. Using ArcMap, we are able to provide growers with a more accurate and better representation of the movement and population dynamics of the cotton bollworm. Weekly updated ArcMaps showing populations statewide will give growers an idea of when to anticipate a flight of bollworms in their fields with one click. These ArcMaps will potentially prevent economic injury level infestations and save growers on unnecessary insecticide application costs while also remaining quick and convenient.

Introduction

Each year, the cotton bollworm (*Helicoverpa zea*, Bodie), infests 100% of all cotton planted in Arkansas (Taillon et al., 2017). Estimated economic loss in 2015 from bollworm has added up to more than $1.7 million (Williams, 2016). Being such an important pest for Arkansas growers, through the federally funded Arkansas IPM program, bollworm populations are monitored on a county level. County agents run bollworm pheromone traps on a weekly basis in their respective counties and submit the data to the IPM coordinator. Historically, these data have been put into graph form and posted online for growers to utilize when making pest management decisions. Though the current visual representation of these bollworm population data have been effective, the use of ArcMap has given us a better, easier means to communicate with our growers the population dynamics on a statewide level with a single image.

Materials and Methods

Hartstack Traps

At the start of the 2018 growing season, county agents in the Delta and River Valley districts of Arkansas placed Hartstack bollworm traps around the cotton and soybean growing areas of their respective counties. Ideally, these traps were to be placed throughout the entire county to achieve statistical significance with ArcMap. Each week, ideally within a 5-day period, county agents were to check the bollworm traps and report the number of bollworm moths in each trap. The traps were emptied of moths every week and the pheromone changed every other week throughout the growing season.

Data for ArcMap

Data from each county was reported with a trap location name, county, GPS coordinates for each trap, and the number of bollworm moths found in each trap. These data were logged into Open Office 4.1.5 by week and uploaded as .dbf files in ArcMap 10.4.1. These data were then used to generate heat maps for each week that joined the GPS coordinates provided by county agents with GPS coordinates readily available by the program and highlighted the locations of each trap with the number of moths in each trap.

Figures and Tables

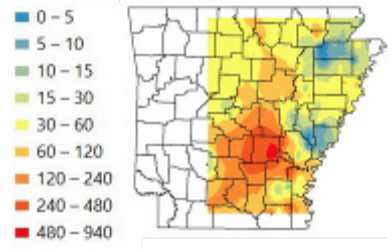

Figure 1. Bollworm Population for the Week of June 15, 2018.

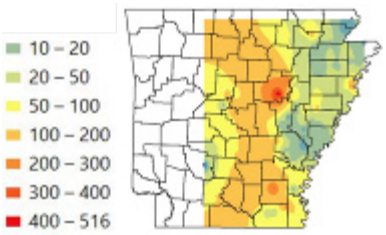

Figure 2. Bollworm Population for the Week of June 22, 2018.

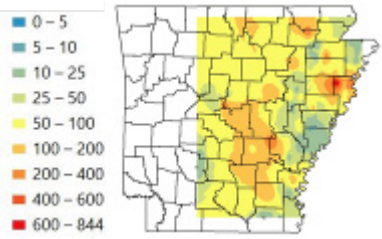

Figure 3. Bollworm Population for the Week of June 29, 2018.

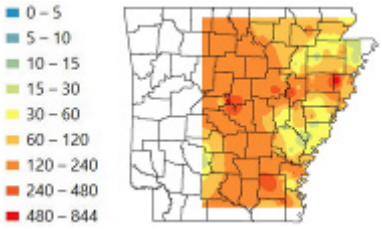

Figure 4. Bollworm Population for the Week of July 6, 2018.

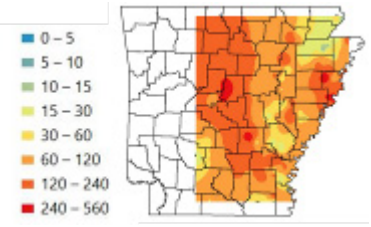

Figure 5. Bollworm Population for the Week of July 13, 2018.

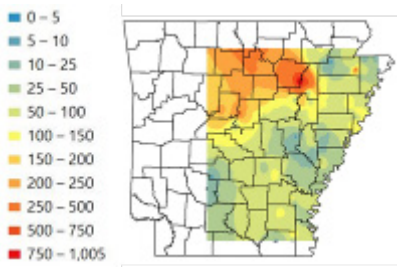

Figure 6. Bollworm Population for the Week of July 20, 2018.

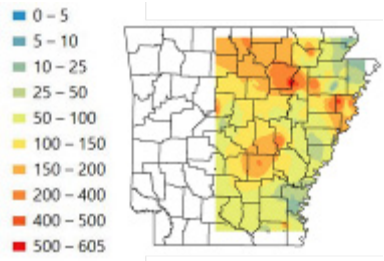

Figure 7. Bollworm Population for the Week of July 27, 2018.

Results and Discussion

Weekly maps for the latter part of June and the month of July show that bollworm populations remained relatively heavy in the central part of the state (Fig. 1-7). Although the populations were lower in the northern part of the state for most of June and July, hotspots were noted in several areas for the weeks of June 22–July 27 (Fig. 2-7). The maps generated in ArcMap give a visual representation of bollworm populations on a multi-county scale. They are generated based on averages of moth trap catches from the different locations in the county and give us a better idea of what to expect in the following weeks with regards to population movement and numbers. Moving forward, several adjustments must be made to fully represent each county and to ensure the best possible map is generated with the data obtained.

Summary

Though only presented currently at county production meetings, the heat maps generated with ArcMap have given Arkansas growers a better, statewide visual representation of bollworm population dynamics as opposed to the previous graphs, which are only presented on the county level. These maps have potential to help growers better understand bollworm populations, predict flights into their areas, and plan bollworm management strategies. In the future, focus will be on optimal trap placement, as well as trap catch reporting to produce the best visual representation of bollworm data to growers.

Acknowledgements

The authors would like to thank the county agents with University of Arkansas System Division of Agriculture Research & Extension for collecting all the data used in this project, as well as the National Institute of Food and Agriculture for funding to conduct this research.

This work is supported by the Crop Protection and Pest Management Program [grant no. 2017-70006-27279/project accession no. 1013890] from the USDA National Institute of Food and Agriculture.

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Williams, M.R. 2016. Cotton Insect Losses. 2015. pp. 507-525. In: Proc., Beltwide Cotton Prod. Res. Conf., New Orleans, La. 5-7 Jan. National Cotton Council, Memphis, Tenn.