Economic Impact of Lygus in Arizona Cotton

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Summary

In the Western U.S., Lygus spp. (Hemiptera: Miridae) cause major losses in cotton, vegetables, seed crops, and a variety of other crops. However, the economic impact of this pest remains largely undocumented in most crops. Two major data sources were used to quantify the economic impact of Lygus in low-desert upland cotton production in Arizona, a statewide Pesticide Use Reporting (PUR) database and an annual “Cotton Insect Losses” survey (CIL) of cotton Pest Control Advisors (PCAs). Both data sources include information on the target pest for insecticide applications, making it possible to single out Lygus control efforts. Our analyses provide important baseline information on the current economic impact of Lygus in Arizona cotton and will help us document future changes due to the introduction of new control strategies or landscape-level changes, such as the introduction of new chemicals or crops.

Posticide Use Reporting

This analysis was made possible by the existence of a statewide database, available as a result of state reporting requirements. The Arizona Department of Agriculture requires applicators to report all pesticides that are applied for hire (i.e., custom), applied by air, that are under Section 18 exemptions, or that are listed on Arizona’s Department of Environmental Quality’s Groundwater Protection List and all restricted use pesticides. These data are entered into a pesticide use reporting (PUR) database by the Arizona Agricultural Statistics Service, processed, and then sent to the Arizona Pest Management Center of the University of Arizona for use in research and education. We have verified and refined data for 2001 to 2009. Information included in the PUR database include location, target crop, product applied, amount applied, and target pest. Although certain kinds of applications are not included in the data (e.g., non-custom, ground applications), we estimate that the database represents 75-90% of statewide Lygus applications in cotton.

User Survey

We develop a “real world” data on cotton insect losses through a face-to-face interactive survey process that encourages (and rewards) stakeholder input. Our questionnaire has been adapted from the National Cotton Council Annual Beltwide Cotton Insect Losses Survey (established in 1979) and expanded to include additional questions on insecticide use patterns and target pests. Arizona and California growers, pool control advisors (PCAs), extension personnel, and industry professionals attend workshops and complete the survey in a guided process. The survey provides quantifiable metrics on insecticide use patterns, costs, targets, frequency, and crop losses due to all stressors of yield, and other real-world economic data (e.g., crop value). These are our most objective tools for assessing change in our systems.

Discussion

Data documenting a pest’s economic impact provides a rationale for funding critical IPM research and education. The economic impact of Lygus is currently not well documented in most crops.

- Arizona’s pesticide use database (PUR) data show that Lygus is a significant pest in cotton, with applications reported for both U.S. (2001-2009). A similar acreage is sprayed for whitefly. Interestingly, the CIL data reports about 100% applications on acreage more than twice that of the PUR data for both Lygus and whitefly, while BWM levels remain relatively consistent with PUR data. Targeted applications for other pests (not shown) drop off dramatically.

- Whitefly stands out as the most important co-target pest when users spray for Lygus. Plum curculio and Heliothines are distant second and third, respectively, due to about 60% deployment on or around cotton. This system is essentially driven by two insect pests.

- The CIL survey documents insect control costs, related yield losses, insecticide use, and user-intended targets including Lygus statewide. These data include applications not represented in the PUR data, and PCA behaviors and perceptions that ultimately impact pest management practices.

- Currently, Lygus control in Arizona cotton is dependent on older, non-selective chemistry, the use of which impacts control of other pests, such as whitefly.

- Despite control efforts, Lygus often account for more than 50% of all insect yield-related losses in Arizona cotton, making this our most damaging pest.

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