STINK BUG DISTRIBUTION BASED ON BLACK LIGHT TRAP CAPTURES ACROSS NORTH CAROLINA IN RELATION TO SURROUNDING AGRICULTURAL HOST PLANT RATIOS

Eric Blinka, Jack Bacheler, J.R. Bradley, and John Van Duyn
North Carolina State University, Raleigh

Abstract

Stink bug populations have begun to flourish and exploit cotton in North Carolina as a result of a reduction in the uses of synthetic insecticides on Bollgard® cotton varieties. Black light traps were set up across North Carolina in 2005 and 2006 and utilized from mid July through the end of August to capture green stink bugs in agricultural environments. The surrounding crops at each trap were identified and mapped. Arial maps of the black light locations were then examined using ArcMap® to derive crop ratios. These crop ratios were then compared to the capture of green stink bugs at each trap to determine possible crop ratios to insect capture correlations.

Introduction

The use of Bollgard® cotton varieties has resulted in a reduced use of synthetic insecticides. This has allowed stink bugs to flourish and exploit cotton increasing their pest status (Greene and Herzog 1999, Leonard et al. 1999, Peters et al. 2004, Roberts 1999, and Willrich et al. 2004). Ehler (2000) demonstrated that stink bugs in California tend to move from one patch of vegetation to another within a farmscape. Current information on the ecological movement of stink bugs is minimal within North Carolina agroecosystem habitats. In order to gain a better understanding of stink bug movement within a farmscape, black light trap captures of green stink bugs, *Acrosternum hilare* (Say) were counted and analyzed against crop ratios of surrounding agricultural crops to determine if any correlations existed.

Materials and Methods

Thirty-five black light traps in 2005 and 40 black light traps in 2006 were placed in agricultural production areas across North Carolina. Traps were placed near field edges in early to mid July and taken down near the end of August for an average of seven to eight weeks of sampling. Black light traps were checked every two to three days and green stink bug numbers were determined. During the growing season, crop areas surrounding the black light traps were mapped and crop areas defined. Aerial maps of the black light trap locations were obtained using the TerraServer web site. The aerial maps were then imported into ArcMap® and surrounding fields were identified using the hand drawn maps. A 366 meter buffer was established around the black light trap and the acreage of each crop within the buffer was determined using ArcMap® tools. Data from 2005 and 2006 were pooled, log transformed, and analyzed using the Proc GLM procedure in SAS®.

Results

Several different crops were found to be contained within the black light trap buffers. These crops included: corn, cotton, pasture, peanut, soybean, tobacco, and trees. Results indicated that all crops are statistically significant with the exception of cotton and trees. The results showed a weak correlation between black light trap captures of green stink bugs and the surrounding crops (Table 1). Peanut, pasture, and trees all had a negative impact on the capture of green stink bugs in the black light traps. Corn, cotton, soybean, and tobacco all had a positive impact on the capture of green stink bugs in the black light traps. However, there was a very high degree of unexplained variability as seen from the R^2-value of 0.134504.

Table 1. Correlation coefficients for crop acreage ratios based on green stink bug captures from black light traps across North Carolina, 2005 and 2006.

Crop	Correlation Coefficient	P-value
Corn	0.0115	0.0001
Cotton	0.0014	0.4025
Peanut	-0.0132	0.0187
Pasture	-0.0093	0.0011
Soybean	0.0059	0.0032
Tobacco	0.0064	0.0256
Trees	-0.0001	0.9659

Significant at $P < 0.05$.

Discussion

The findings of this study were statistically significant, and black light trap captures of green stink bugs during this time period of the growing season did correlated to the acreage of surrounding crops. However, despite the statistical significance, the R^2 – value suggested that there was too much unexplained variation for the light traps to be considered as a reliable tool in determining green stink bug populations based upon surrounding crop ratios. These findings also help to support the idea that stink bugs are ambiguous in the environment and continually move from crop to crop looking for a suitable host.

Acknowledgments

Special thanks to the Cooperating North Carolina Extension Agents and Producers, Cotton Inc., Southeast Cotton Producers, and Alan Stephenson.

References Cited

ArcMap Software: ArcINFO 9.1 by ERSI.

Ehler, L. E. 2000. Farmscape ecology of stink bugs in northern California. Mem. Tomhas Say Publ. Entomol. Entomol. Soc. Am. Press, Lanham, MD.

Greene, J. K., and G. A. Herzog. 1999. Management of stink bugs using symptoms of boll injury as a monitoring tool, pp. 1041-1044. *In* Proceedings, 1999 Beltwide Cotton Conference, 3-7 January 1999, Orlando, FL. National Cotton Council, Memphis, TN.

Leonard, B. R., J. B. Graves, and P. C. Ellsworth. 1999. Insect and mite pests of cotton, pp. 489-552. *In* C. W. Smith (ed.), Cotton: origin, history, technology, and production. Wiley, New York.

Peters, E. A., D. R. Cook, M. M. Willrich, and B. R. Leonard. 2004. Temporal occurrence of stink bug spp. (Heteroptera: Pentatomidae) in Louisiana soybean, grain sorghum, and cotton fields, pp. 1905-1908. *In* Proceedings, 2004 Beltwide Cotton Conferences, 5-9 January 2004, San Antonio, TX. National Cotton Council, Memphis, TN.

Roberts, P. 1999. Observations of emerging pests in low spray environments, p. 1034. *In* Prceedings, 1999 Beltwide Cotton Conferences, 3-7 January 1999, Orlando, FL. National Cotton Council, Memphis, TN.

TerraServer-USA: http://terraserver.microsoft.com/

Willrich, M. M., B. R. Leonard, and J. Temple. 2004. Injury to preflowering and flowering cotton by brown stink bug and southern green stink bug. J Econ. Entomol. 97:1928-1934.