BALANCING SAMPLE SIZE, ACCURACY, AND TIME WHEN MONITORING STINK BUG DAMAGE

M.D. Toews
University of Georgia
Tifton, GA
E. Blinka
A. Herbert
Virginia Tech
Suffolk, VA
J. Bacheler
North Carolina State University
Raleigh, NC
S. Malone
Virginia Tech
Suffolk, VA
J. Van Duyn
North Carolina State University
Plymouth NC
P.M. Roberts
University of Georgia
Tifton, GA
J.K. Greene
Clemson University
Blackville, SC
W.D. Shurley
University of Georgia
Tifton, GA

Abstract

Previous research on estimating stink bug damage in developing cotton bolls demonstrated that dissection and subsequent internal assessment was the most accurate and sensitive detection method. However, insect scouts and growers are reticent to adopt this method because they perceive the time requirements as excessive. To significantly reduce the time for estimating stink bug damage, we investigated an alternative sampling procedure utilizing enumeration of external stink bug feeding lesions on groups of bolls. Linear regression model fit, lack of fit tests, and inverse prediction confidence intervals were used to directly relate the two detection methods. Results show that directly regressing counts of external lesions on counts of internal damage symptoms (warts, stained lint and feeding punctures) was ineffective (r-square = 0.39) and had a significant ($P<0.05$) lack of fit statistic. However, model fit significantly improved when evaluating groups of bolls in an individual sample by regressing the proportion of bolls with at least one external lesion on the proportion of bolls with at least one internal damage symptom. Increasing the number of bolls in the sample from 10 to 20 increased the r-squared valued from 0.56 to 0.67. Conversely, the use of a talley threshold greater than 1 external lesion to classify a boll as damaged did not increase the r-squared beyond the values obtained using a single lesion. As a result of increased speed and significant statistical relationships, the authors suggest that evaluation of external lesions should be further evaluated as a means of estimating stink bug damage to developing cotton bolls.