Genetic Analysis of Asian Longhorned Beetle Populations from Chicago, New York, and China Using the RAPD Technique

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Abstract

Anoplophora glabripennis samples were collected in the Ravenswood area of Chicago, near the Mt. Zion cemetery in Queens, New York (provided by Leah Bauer) and the Gansu Province in northwest China (provided by Leah Bauer). DNA isolation procedures have been developed for use on *A. glabripennis* larval samples fixed in ethanol. Random amplified polymorphic DNA (RAPD) fragments were generated and screened for use as markers. Most primers yielded DNA fragments from Asian longhorned beetle samples (ALB) with low to moderate size heterogeneity. A few primers analyzed to date yielded DNA fragments exhibiting extensive size heterogeneities. Primers yielding DNA fragments with moderate heterogeneities separated the Chicago and New York ALB samples from ALB samples from the Gansu province of China. Primers yielding highly heterogeneous sized fragments separated the Chicago samples from the New York samples, and the Chicago and New York samples from the samples from the Gansu province of China. These results suggest that the Chicago and New York populations represent genetic bottlenecks, which arose from introduction of a relatively small number of individual beetles. Phylogenetic analysis grouped the samples from the Gansu province of China with the samples from New York, indicating that the New York samples exhibit a greater genetic similarity to the Gansu province samples than to the Chicago samples. This result may suggest that the New York infestation arose from ALBs originating from or near the Gansu province of China, and that the Chicago infestation arose from ALBs originating from a different region of China. Additional analysis with more primers and ALB samples from different regions of China are needed to determine if this preliminary conclusion is valid. DNA primers yielding highly heterogeneously sized fragments also appear useful for analysis of ALB samples from individual host trees. Phylogenetic analysis suggests that ALB females may exhibit host preferences or "imprinting' behavior. In addition, several fragments have been identified that may be useful for distinguishing *A. glabripennis* from other cerambycids and other wood boring insect species. Samples of *Plectrodera scalator* (cottonwood borer), *A. chinensis* (citrus longhorned beetle), *Tetropium castaneum* (brown spruce longhorned beetle), and other species are being sought for these investigations.