USING ASIAN LONGHORNED BEETLE MALE-PRODUCED PHEROMONE AND HOST VOLATILES FOR MONITORING

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ABSTRACT

Anoplophora glabripennis (Motschulsky) (Coleoptera: Cerambycidae: Lamiinae), commonly known as the Asian longhorned beetle, is a wood-boring invasive species introduced from Asia to North America and Europe through solid wood packing material. *A. glabripennis* is a serious pest both in China and the United States. This research project was developed in response to the need for efficient monitoring traps to assess population density and dispersal in the field and to detect new introductions at ports of entry. The first stages of the project aimed at filling the gaps in our knowledge of the effect of semiochemicals on *A. glabripennis* adult behavior and exploring potential use of these chemicals for monitoring purposes. Semiochemicals studied were the male-produced putative volatile pheromone (blend of 4-(n-heptyloxy)butan-1-ol and 4-(n-heptyloxy)butanal) and plant volatiles.

The first series of experiments were conducted using the male-produced blend, its two components and plant volatiles in choice bioassays against a hexane control. In Y-olfactometer and walking wind tunnel bioassays, virgin females were more attracted to the male-produced blend and its alcohol component than males. Virgin males were even repelled at higher doses. These results suggest that the male-produced pheromone plays a role in mate-finding. When plant volatiles were offered in the Y-olfactometer, males were more attracted than females. Out of 12 plant volatiles tested, (-)-linalool, cis-3-hexen-1-ol and linalool oxide were attractive to both genders, while 3-carene and trans-caryophyllene were only attractive to males. Combining the male pheromone blend with (-)-linalool alone or with cis-3-hexen-1-ol attracted significantly more males than did the pheromone alone. Combinations of the pheromone and plant volatiles were also tested in the greenhouse, along with four trap designs, namely Intercept™ Panel, hand-made screen sleeve, plum curculio, and Lindgren funnel traps. The former two trap designs caught significantly more beetles than the latter two.

Subsequently, field trapping experiments were conducted in China in the summers of 2007 with Intercept™ panel traps hung on poplar trees and in 2008, with Intercept™ panel traps hung on poplar trees, screen sleeve traps wrapped around poplar trunks, and Intercept™ panel traps hung on bamboo poles 20 m away from host trees. Traps were baited with the *A. glabripennis* male-produced pheromone alone or in different combinations with plant volatiles. Traps baited with the male-produced pheromone alone caught significantly more females than control traps in both years. The addition of a mixture of (-)-linalool, cis-3-hexen-1-ol, linalool oxide, trans-caryophyllene and trans-pinocarveol to the pheromone significantly increased trap catches of virgin females. Screen sleeve traps baited with a combination of (-)-linalool and the pheromone caught the highest number of beetles overall in 2008, while traps placed on bamboo polls caught the lowest number. While the logistics for the most effective implementation of a trapping program using a mixture of the pheromone and plant volatiles require additional studies, these results indicate that this pheromone has considerable promise as a monitoring tool for *A. glabripennis* in the field.