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Strategies for assessing the host specificity of fire ant decapitating flies (Phoridae: *Pseudacteon*)

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Fire ant populations in their South American homeland are about 1/5 to 1/10 as dense as populations in North America. Escape from numerous natural enemies left behind in South America is the most apparent explanation for the intercontinental population differences. Classical or self-sustaining biological control agents are currently the only potential means for achieving permanent regional control of fire ants. Successful use of biological control agents will not eradicate imported fire ants, but it could help shift the ecological balance in favor of native ants. If this happened, fire ant populations in the United States could be reduced to levels similar to those in South America.

Among the many kinds of natural enemies in South America are at least 20 species of *Pseudacteon* decapitating flies. These flies hover a few millimeters above fire ant workers before diving in and rapidly injecting an egg into the body of a host. Shortly after hatching, a decapitating fly maggot moves into the head of its host, where it develops slowly for two to three weeks. Just prior to pupation, the third instar maggot appears to release an enzyme that dissolves the membranes holding the exoskeleton together, a process that usually results in rapid decapitation of the living host. The maggot then consumes all of the tissue inside the ant head and pupates within the empty head capsule, which functions as a pupal case. The fact that fire ants have evolved a suite of specialized defensive behaviors against decapitating flies suggests that these flies have the potential to be good biological control agents.

This presentation will summarize studies of decapitating fly host range that have been and are being used to evaluate the safety of releasing these flies in North America as classical biological control agents against imported fire ants. Specifically, we will outline our efforts to assess host specificity with: (1) literature searches, (2) general field observations, (3) field tests in the native range, and (4) laboratory choice and no-choice tests in quarantine. In addition we will discuss a battery of food preference tests that were conducted to determine if the flies were attracted to food items that might make them a nuisance or a potential disease vector. Post-release host range tests will also be discussed in reference to pre-release predictions. Finally, we will discuss host range testing of *Pseudacteon* decapitating flies in reference to genetic variability of fly biotypes, the types of tests conducted and the statistical designs used.

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