

MATING PARAMETERS ASSOCIATED WITH FERTILITY IN *ANOPIPHORA GLABRIPENNIS* (COLEOPTERA: CERAMBYCIDAE)

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Abstract

There is a critical need for information on the mating behavior of *Anoplophora glabripennis* to provide the biological basis for predicting population dynamics, especially as beetle population size declines due to eradication efforts. To estimate the number of females a male can successfully mate in its lifetime and determine how male age affects mating success, one male from each of three laboratory strains (Illinois, New York, and China) was caged with 1-5 unmated females every weekday for its first 6 weeks of life, then with two or three females per week for the remainder of its life. To determine the frequency and duration of matings associated with sustained female fertility, 10 pairs from each strain were mated in each of four mating schemes: a single mating encounter, one mating encounter per week for 5 weeks, two mating encounters per week for 5 weeks, and unlimited mating encounters (paired for life). All mating encounters were terminated after one or two copulation events of 3 minutes or longer. A mating was considered successful if the female produced eggs that hatched.

Male beetles between 11 and 104 days of age were able to mate successfully. Males generally had one or more unsuccessful matings prior to the first success. Male fertility and mating success peaked for all three males

between 3 and 5 weeks of age, then slowly declined until stopping at about week 15. When the males reached 12 weeks of age, they were less agile and less able to grasp and hold a female, which in nature would probably result in a female's escape without mating. The shortest interval between two successful matings was 5 minutes (when a second female was presented immediately after another mating). The shortest intervals between matings occurred when males were 18 - 26 days old. The most females successfully mated by one male was 27, resulting in a total of 1,366 progeny.

On average, females mated 10 times or more had a significantly higher percentage of viable eggs than did females mated one or five times, but fecundity was unaffected. The number of mating encounters did not have a significant effect on female longevity. These results suggest that greater than 1 hour of total time *in copula* (excluding mate guarding time) is needed for maximum sustained fertility, as measured by percentage hatch. In nature, this copulation time requirement could be satisfied by one or more mating events of longer duration (multiple copulations), rather than through a series of short encounters. Shorter total time *in copula* decreases the likelihood that sufficient sperm will be transferred for maximum female fertility over her entire life.