

University of Florida Book of Insect Records

Chapter 6 *Shortest Generation Time*

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*Generation time is the time needed to complete one generation. Insects of short generation time have higher rates of increase and develop resistance to insecticides more quickly than insects of comparatively longer generation time. Temperature and food quality are two key factors that may influence the generation time. The aphid *Rhopalosiphum prunifolia* has the shortest generation time: 4.7 days at 25 C.*

A generation is from a given stage in the life cycle to the same stage in the offspring (Borror et al 1981). Generation time is the time required to complete a generation. Based on this definition, I sought the insect that has the shortest generation time.

Methods

Candidates were sought in general entomology textbooks from the 1950s to 1980s and via personal communications. *AGRICOLA* (1970-1994), *Biological Abstracts* (1985-1994) and *CAB* (1985-1992) were searched for primary literature.

Results

Aphids may have the shortest generation time for their parthenogenetic reproduction. Gutierrez et al. (1971) reported that *Aphis craccivora* needed 5.8 days to complete a generation at 20 C. Elliot and Kieckhefer (1989) reared aphid *Rhopalosiphum padi* with barley under constant temperatures. They found that apterae take 5.1 days at 26 C to finish one generation. *Aphis gossipii*, one of the most serious insect pest of

crops, also requires only 5.0 days to complete one generation (Petitt et al. 1994). Noda (1960) reported that *R. maidis* finishes one generation in 5.0 days at 25 C. *Rhopalosiphum prunifoliae* takes only 4.7 days to fulfill its generation at 25 C (Noda 1960). This may be the shortest generation time in insects.

Discussion

What is the significance for insects to have a short generation time? They may have prodigious rates of increase once environmental conditions are suitable (Dixon 1987). The population can develop resistance to insecticides. Georghiou & Taylor (1986) reported that the time needed for development of aldrin resistance decreased with shorter generation time. The aphids *Aphis gossipii* and *Myzus persicae* have a broad spectrum of insecticide resistance.

What factors affect the generation time? Dixon (1987) reported that temperature and food quality are important factors which determine the developmental rate. Radford (1967) demonstrated that food supply affects mean relative growth rate. *R. prunifoliae* takes 21.3 days for one generation at 10 C while only 4.7 days at 25 C (Noda 1960). Other factors may shorten or extend the generation time. The yucca moth *Prodoxus y-inversus* diapaused for 19 years (Powell 1989). This extends the generation time. The same species usually develop more quickly in tropical areas than in temperate areas. For various reasons the generation time may be much different under laboratory conditions compared with field conditions. In this paper, the conclusion was based on labo-

ratory conditions that optimize development.

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