6.10 Effects of host plant on fitness of the Asian citrus psyllid, *Diaphorina citri*

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The reproductive biology of the Asian citrus psyllid, *Diaphorina citri* Kuwayama (Hemiptera: Psyllidae), is closely tied to the availability of new leaf flush for egg laying and subsequent development of psyllid nymphs. Increases in the psyllid population are thus most evident during periods of abundant new flush. However, what is not well understood are the varying effects of the host plant on psyllid fitness that may affect the magnitude of the increase or decrease in psyllid populations.

The host range of *D. citri* includes many citrus and close citrus relatives. While there are many observations about preferred hosts of *D. citri* (Halbert and Manjunath 2004), only a few comparative laboratory studies have been conducted to date that specifically address suitability of different host plants on psyllid fitness under controlled conditions. In one study, Tsai & Liu (2000) examined the biology of *D. citri* on four host plants, orange jasmine (*Murraya paniculata* (L.) Jack), rough lemon (*Citrus jambhiri* Lushington), sour orange (*Citrus aurantium* L.), and grapefruit (*Citrus* × *paradisi* Macfad.). In this study, grapefruit was determined to be the best host, followed by the other plant species tested, among which there was no statistical difference. A second study, Nava et al. (2007) compared the duration and viability of psyllid egg and nymphal stages, sex ratio, fecundity and longevity on Rangpur lime (*Citrus limonia*), orange jasmine (*Murraya paniculata*) and Sunki mandarin (*Citrus sunki)* across a range of temperatures. Nymphal viability was lower on mandarin than on the other hosts evaluated while overall nymphal development was highest on *C. limonia* and *M. paniculata*. Fecundity was highest on *M. paniculata*. No other detailed comparative studies have been conducted on the effect of host plants on the fitness of *D. citri*, especially with regards to commercially grown citrus varieties in Florida.

As part of a larger project investigating the effects of host plant quality on psyllid fitness, fitness of psyllids was examined when completing development on various citrus rootstock species commonly used in Florida citrus production. Here we report our intial findings comparing psyllid fitness on two rootstock species, sour orange (*Citrus aurantium* L.) and Cleopatra mandarin (*Citrus reticulata* Blanco). Previously, we have observed marked differences in psyllid colonization of these two rootstock species when provided as host plants for laboratory maintained colonies of *D. citri*. Psyllids were observed to readily colonize *C. aurantium* whereas little or no development was believed to occur on *C. reticulata*.

The fitness of *D. citri* when reared on *C. aurantium* and *C. reticulata* was determined by evaluating the effects of these host plants on psyllid fecundity and longevity as well as mortality and developmental rate of psyllid nymphs. Host plants of both species used in this study were 30 cm in height grown in containers of potting media consisting of Canadian sphagnum peat, perlite and vermiculite mix. Plants were fertilized with 20-20-20 (N, P, K) soluble fertilizer every two weeks and watered three times per week. Plants were pruned two weeks prior to the initiation of experiments to obtain young flushes. Psyllids used in this study were from a colony reared in a

greenhouse at a temperature of 27 ± 2°C, with a relative humidity (RH) of 70 ± 20%. When young flushes were expanded, a pair of adult psyllids from the greenhouse colony was encaged on each flush, using small cylinder clear acetate transparent cages with a musseline top and closed with a sponge in its lower opening to prevent psyllid escape. After psyllids were caged, plants were moved to growth chambers with a temperature of 27 ± 2° C, with a relative humidity (RH) of 70 ± 20% and a photoperiod of 12D:12L. To compare the reproductive performance on the two hosts, psyllids were left in the cages for a two week period, after which adults were removed and counts were made of the number of eggs laid. The overall rate of development from eggs to adults was determined by making daily counts of the number of adults emerged. Psyllid longevity on these host plants was determined by collecting adults reared on these host plants and making transfers to new host plants of the same species on which counts of adult longevity were made. Duration of each nymphal stage and overall duration of nymphal development was assessed by collecting pairs of adult psyllids reared on each host plant and caging them on flushing plants of the same species on which the adults developed. After 24 h, adults were removed and plants placed into a growth chamber. Nymphal development was recorded daily for each plant by using a stereomicroscope to observe ecdysis and survivorship of psyllid nymphs until adult emergence.

Our initial results of this study provide evidence that *C. reticulata* is not a suitable host plant for psyllid development. Detailed results will be presented and implications for future psyllid management programs discussed.

References

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