

Wigunda Rattanapun 2009: Mango Varietal Preference and the Effect of Physiological Changes During Mango Ripening on Host Utilisation by *Bactrocera dorsalis* (Hendel) (Diptera: Tephritidae). Doctor of Philosophy (Entomology), Major Field: Entomology, Department of Entomology. Thesis Advisor: Assistant Professor Weerawan Amornsak, Ph.D. 138 pages.

Most tropical fruit flies lay their eggs only into mature fruit, but a small number can also oviposit into unripe fruit. Little is known about the link between adult oviposition preference and offspring performance in such situations. I examined the influence of different ripening stages of two mango *Mangifera indica* L. (Anacardiaceae) varieties on the preference and performance of the Oriental fruit fly, *Bactrocera dorsalis* (Hendel) (Diptera: Tephritidae), a fly known to utilise unripe fruit. Work was carried out as a series of laboratory-based oviposition experiments and larval growth trials. The results demonstrated a general preference by *B. dorsalis* for mango variety Oakrong over variety Namdorkmai, but in most cases the single largest dependent variable influencing results was fruit ripening stage. Ripe and fully-ripe mangoes were most preferred for oviposition by *B. dorsalis*. In contrast, unripe mango was infrequently used by ovipositing females, particularly in choice trials. Consistent with the results of oviposition preference, ripe and fully-ripe mangoes were also best for offspring survival, with a higher percentage of larval survival to pupation and shorter development times in these fruits. Changes in total soluble solids (TSS) and firmness correlated with changing host use across the ripening stages. Regardless of the mango variety or ripening stage, *B. dorsalis* had difficulty penetrating the pericarp of all fruits offered in experiments. Under the influence of egg load pressure, high egg-load female flies made more attempts to oviposit into unripe fruit than low egg-load females. Larval survival was also often poor in all experiments. I discuss the possibility that there may be differences in the ability of laboratory and wild flies to penetrate fruit for oviposition, or that in the field flies more regularly utilise natural fruit wounds as oviposition sites. To formalize the adult oviposition preference and larval performance at the “within-fruit” level, experiments were performed to record the number of oviposition attempts made into three fruit parts (top, middle and bottom) and larval behavior within different parts of a fruit, again at three mango ripening stages. Results indicate that female *B. dorsalis* do not oviposit uniformly across a mango fruit, but lay most often in the top of fruit and least in the bottom part, regardless of ripening stage. In contrast, for nearly all data except percent adult emergence from pupae, there was no evidence of larval feeding site preference or performance (development time, pupal weight, percent pupation) being influenced by fruit part, within or across fruit ripening stages. More larval movement in ripe fruit (compared to fully ripe fruit) is probably indicative of larger variation in host nutritional quality during fruit ripening. Differences in mechanical (firmness) and chemical [TSS, titratable acidity (TA), total non-structural carbohydrates (TNC)] traits between different fruit parts were correlated with adult fruit utilisation. The results are ambiguous with respect to supporting, or rejecting, a positive adult preference/offspring performance relationship at within-fruit level for *B. dorsalis*. To further understand the role played by different host cues in female orientation, a third set of experiments were run. These isolated host visual and olfactory cues for three mango ripening stages. Results of these studies indicated that host fruit color played only a minor role in host quality assessment by female flies, whereas host fruit volatiles played an important role in the determination of host quality. Overall results show that while *B. dorsalis* is physiologically capable of utilising green fruit, it much prefers to oviposit into ripe and fully-ripe fruits, and larvae do better in such fruit.

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Thesis Advisor's signature