Degree of Fruit Ripeness Affecting Infestation of Papaya by Two Species of Fruit Flies (Diptera: Tephritidae)\textsuperscript{1}

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Abstract


Infestation of papaya fruits by two species of fruit flies, the oriental fruit fly, \textit{Bactrocera dorsalis} (Hendel), and the melon fly, \textit{B. cucurbitae} (Coquillett), was tested in the laboratory for mature green, 1–2 yellow-stripe, 2–3 yellow-stripe, 5 yellow-stripe, and mature yellow (fully ripe) fruits of the ‘Tainung No. 2’ papaya (\textit{Carica papaya} L.), and mature green, quarter, half, and mature yellow fruits of the ‘Sunrise’ papaya. The fruit ripeness levels were categorized visually based on the extent of the skin’s yellow color development. Mechanical measurements of colorimetric values, soluble solid contents, acidity, and flesh hardness for each ripeness category were also carried out. Oriental fruit flies only laid eggs in fully ripe fruits of the ‘Tainung No. 2’ papaya, while melon flies could lay eggs in both the 5 yellow-stripe and fully ripe fruits. The 2–3 yellow-stripe ‘Tainung No. 2’ papayas, which is the ripeness degree the export papayas being harvested, were never infested by both fly species. For ‘Sunrise’ papayas, oriental fruit flies laid eggs in half yellow and fully ripe fruits, while melon flies laid eggs in fruits of all ripeness levels except of the mature green fruits. Whether the papaya fruit was subject to fruit fly oviposition depended not only on the ripeness level of the fruit but also on the fly density. As fly densities become high, the ripeness degree that would suffer fly infestation could become lower. We also found that a well-established screenhouse with a multiple-layer-door design could effectively prevent fruit fly invasion. Thus, this study suggested that the protocol for export papayas, at least the ‘Tainung No. 2’, to be harvested at proper ripeness degrees in combination with cultivation in a well-established screenhouse should be possible to replace the current vapor heat quarantine treatment. Further intensive field screen of melon fly infestation in papaya screenhouses need to be conducted to determine if screenhouse cultivated ‘Sunrise’ papayas could also be exempted from additional quarantine treatments.

Key words: \textit{Bactrocera dorsalis, Bactrocera cucurbitae, Papaya, Fruit fly infestation, Quarantine.}

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