

Mexican Fruit Fly, *Anastrepha ludens* (Loew) (Diptera: Tephritidae), Addendum to the Bibliography 1999-2019

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ABSTRACT

The Mexican fruit fly is a major pest of tropical fruits including citrus and mangoes. Consequently, it is a subject of active research with an extensive but scattered literature. An initial bibliography, published in 1986, contained 205 citations. A second bibliography published in 2000, covering the period 1986 to 1999, included an additional 171 citations. The current update to this bibliography series covers the period 1999 up to June of 2019 and includes an additional 320 citations.

RESUMEN

La mosca Mexicana de la fruta es una plaga importante de las frutas tropicales incluidos los cítricos y los mangos. En consecuencia, es un tema de investigación activa con una literatura extensa pero dispersa. La bibliografía inicial, publicada en 1986, contenía 205 citas. La bibliografía más reciente, que abarca el período 1986 a 1999, incluye 171 citas adicionales. Una actualización de esta bibliografía que cubre el período hasta Junio de 2019, incluye 320 citas adicionales.

Additional index words: citrus, quarantine, eradication, Rio Grande Valley.

The Mexican fruit fly, *Anastrepha ludens* (Loew) (Diptera: Tephritidae) is an invasive insect species indigenous to Mexico and much of Central America. The species infests fruit orchards including citrus groves in Central and South America and has the potential to cause millions of dollars in damage to the citrus industry in south Texas. In 2012, Mexican fruit fly was declared eradicated in the United States but is still a recurring pest in the lower Rio Grande Valley region of Texas. To combat this invasive species, the USDA APHIS PPQ and the Texas Department of Agriculture conduct a Preventative Release Program using the Sterile Insect Technique (SIT). The program goals are suppression, control, and eradication of this invasive pest through a system of mass rearing, sterilizing, and aerial releasing of approximately 150 million sterile Mexican fruit flies per week. In order to verify the integrity of the control program, a surveillance and trapping program using five traps per square mile and the most effective lure/trap combination is in place across the Lower Rio Grande Valley.

While the US is officially free from Mexican fruit fly, outbreaks are occasionally declared in commercial areas adjacent to residential areas. At the time

of this writing in 2019, there were eight quarantine areas along the Rio Grande stretching from Brownsville to Laredo, Texas. A risk-based approach to managing the movement of citrus within the US was approved in late 2015. The approach includes a range of in-field management techniques including SIT, bait sprays, and the exclusion of exports from within the outbreak center to certain citrus producing states. However, citrus groves more than 250m from the outbreak center are able to ship fruit. The risk analysis includes quantitative assessment of the risk posed by fruit flies.

Mexico and the United States support research programs seeking new or enhanced technologies for control of this pest, a better understanding of Mexican fruit fly biology, and development of disinfestation protocols. These efforts have been aided by Mexican fruit fly bibliographies compiled by Holler & Calkins (1986) with 205 citations dating back to Howard (1888) to a newly proposed control method using the sterile insect technique in Holler et al. (1984). Thomas (2000) compiled 171 citations dating from 1986-1999 including novel chemistries with new delivery systems; non-chemical treatment such as heat, radiation,

and controlled atmospheres; production and testing of new better lures; and the application of the sterile insect technique. The following updated bibliography with 320 citations from 1999-2019 includes continued studies and improvement in trap/ lure/ capture fluid methodology and attract and kill technology. Recent diet research has provided improvements in larvae and adult fruit fly diet. A new pupa color-based sexing strain, Tapachula-7, has been developed and employed in sterile insect technique programs. Numerous quality control and mating competitiveness tests have been conducted looking at effects of mass reared insects compared to feral populations. Methods development and research is continuing on Mexican fruit fly including the use of genetics and molecular biology to better understand the fly and for pathway analysis on out-break fly sources.

The format for citation follows that used by Holler & Calkins (1986) and Thomas (2000) which follows that used by the Bulletin of the Entomological Society of America. We have sought to include all articles published in scientific journals but not those in newspapers, magazines or lay periodicals. Book chapters are included if the subject matter deals primarily with the Mexfly or species of *Anastrepha* including *A. ludens*. Likewise, abstracts, theses, and unpublished technical reports are not included.

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