

# EPPO Datasheet: *Anastrepha obliqua*

Last updated: 2021-01-08

## IDENTITY

**Preferred name:** *Anastrepha obliqua*

**Authority:** (Macquart)

**Taxonomic position:** Animalia: Arthropoda: Hexapoda: Insecta: Diptera: Tephritidae

**Other scientific names:** *Acrotoxa obliqua* (Macquart), *Anastrepha fraterculus mombinpraeoptans* Sein, *Anastrepha fraterculus* var. *ligata* Lima, *Anastrepha fraterculus* var. *mombinpraeoptans* Sein, *Anastrepha trinidadensis* Greene, *Tephritis obliqua* Macquart, *Trypeta obliqua* (Macquart)

**Common names:** Antillean fruit fly, West Indian fruit fly

[view more common names online...](#)

**EPPO Categorization:** A1 list

[view more categorizations online...](#)

**EU Categorization:** Quarantine pest ((EU) 2019/2072 Annex II A)

**EPPO Code:** ANSTOB



[more photos...](#)

## Notes on taxonomy and nomenclature

This species was first described by Macquart (1835) as *Tephritis obliqua*, although for many years that name was confused and was not recognized as pertaining to this species (Steykal, 1975), thus it has been known by a variety of other names. The current combination was proposed by Schiner (1868). The species has also been described as *Anastrepha fraterculus* var. *mombinpraeoptans* Seín (1933), *Anastrepha fraterculus* var. *ligata* Lima (1934), and *Anastrepha trinidadensis* Green (1934), which are synonyms. Most records of *Anastrepha acidusa* (Walker) are misidentifications of this species, although *A. acidusa* is also a valid but rare species. Name, host plant, and distribution data for *A. obliqua* and other fruit flies are available under Fruit Fly Databases on the USDA Compendium of Fruit Fly Host Information (<https://coffhi.cphst.org/>).

## HOSTS

This species is one of the most significant pests of mango (*Mangifera indica*) and hog plums and mombins (*Spondias* spp.). It also attacks carambola (*Averrhoa carambola*), guavas (*Psidium* spp.), and a range of other fruit crops. A total of 90 species have been reported as natural hosts, although the records for a few of these hosts are questionable. *Citrus* species are only occasional hosts. An additional 21 commercial fruit species have been infested under artificial conditions (Norrbom, 2004).

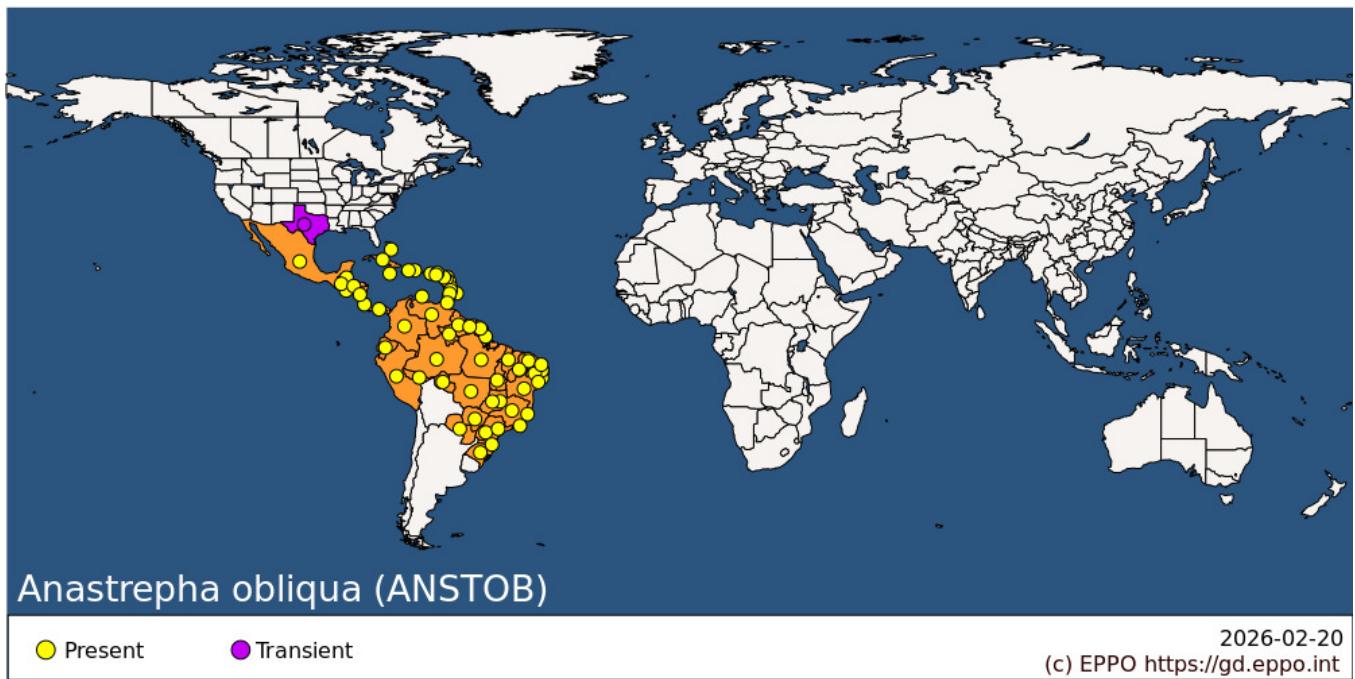
**Host list:** *Anacardium occidentale*, *Anacardium*, *Averrhoa carambola*, *Campomanesia guazumifolia*, *Citrus*, *Eugenia myrcianthes*, *Eugenia stipitata*, *Eugenia uniflora*, *Malpighia glabra*, *Mangifera indica*, *Plinia cauliflora*, *Psidium acutangulum*, *Psidium guajava*, *Sarcomphalus joazeiro*, *Sideroxylon obtusifolium*, *Spondias dulcis*, *Spondias mombin*, *Spondias purpurea*, *Spondias tuberosa*, fruit trees

## GEOGRAPHICAL DISTRIBUTION

*Anastrepha obliqua* is one of the most widespread species of *Anastrepha*, occurring from Mexico and the West Indies to northern Argentina. It is invasive in the Lesser Antilles (CABI, 2008).

Reports of its introduction to Bermuda were erroneous (Woodley & Hilburn 1994). Records from the Bahamas (White & Elson-Harris 1992) are also doubtful. It was temporarily invasive in Key West, Florida (USA) in the 1930s (Steck, 2001), and is infrequently trapped in the Rio Grande Valley in Texas. It has been intercepted in Chile but is

not established.



**North America:** Mexico, United States of America (Texas)

**Central America and Caribbean:** Antigua and Barbuda, Bahamas, Barbados, Belize, Costa Rica, Cuba, Dominica, Dominican Republic, El Salvador, Grenada, Guadeloupe, Guatemala, Haiti, Honduras, Jamaica, Martinique, Montserrat, Netherlands Antilles, Nicaragua, Panama, Puerto Rico, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Trinidad and Tobago, Virgin Islands (British), Virgin Islands (US)

**South America:** Brazil (Acre, Alagoas, Amapa, Amazonas, Bahia, Ceara, Distrito Federal, Espirito Santo, Goias, Maranhao, Mato Grosso, Mato Grosso do Sul, Minas Gerais, Para, Paraiba, Parana, Pernambuco, Piaui, Rio de Janeiro, Rio Grande do Norte, Rio Grande do Sul, Rondonia, Roraima, Santa Catarina, Sao Paulo, Sergipe, Tocantins), Colombia, Ecuador, French Guiana, Guyana, Paraguay, Peru, Suriname, Venezuela

## BIOLOGY

As in *Anastrepha* spp. generally, eggs are laid in fruits. In the case of *A. obliqua* they are laid singly, just below the skin with the short anterior lobe that is believed to have a respiratory function, projecting slightly outside the fruit (Murillo & Jirón, 1994, Aluja *et al.*, 1999). Mean development time for eggs, larvae and pupae together is 48.5 days, depending on the host fruit and temperature and other environmental conditions (Birke *et al.*, 2013). Larvae pass through three instars and feed in the pulp of the fruit (Aluja *et al.*, 1999). Mature larvae exit the fruit and pupariate in the soil. Females mark fruit in which they have oviposited with an oviposition deterring pheromone (Aluja *et al.*, 1999). Adult males produce a pheromone and lek to attract females for mating. Calling occurs in the day, with the highest peak in the morning (Birke *et al.*, 2013). Adults occur throughout the year (Christenson & Foote, 1960), with a pronounced peak associated with the fruiting season of mango and *Spondias* (Hedström, 1994; MIDA, 2013).

## DETECTION AND IDENTIFICATION

### Symptoms

Attacked fruit have tiny oviposition punctures, but these and other symptoms of damage are often difficult to detect in the early stages of infestation. Considerable damage may occur inside the fruit before symptoms are visible externally, often as networks of tunnels accompanied by rotting.

### Morphology

## Immature stages

The identification of larvae of *Anastrepha* species, as is the case for most fruit flies, is extremely difficult. Larvae have been described for only 9% of the species of *Anastrepha* (Steck *et al.*, 2019). *Anastrepha obliqua* is included in the key of Steck *et al.* (1990) and the interactive key of Carroll *et al.* (2004) for third stage larvae, but it cannot be reliably distinguished from similar species such as *A. fraterculus* and *A. suspensa*. Steck *et al.* (1990), White & Elson-Harris (1992), Carroll *et al.* (2004) and Frías *et al.* (2006) provided descriptive information for the third instar.

The larvae of *A. obliqua* feed in the pulp of their host fruits. As is the case for other *Anastrepha* species, the larvae are whitish, 7.5–9.0 mm long, lacking an external head capsule. The two mandibles, or mouthhooks, are strongly developed. The body is tapered anteriorly and truncate posteriorly. The posterior spiracular plate is weak, unpigmented, without a peritreme, and with three openings arranged with their medial ends converging, the dorsal and ventral ones subparallel or oriented at less than 90°. There are 6–11 oral ridges, and 9–18 tubules on the anterior spiracle. Thoracic segments 2 and 3 have 2–5 rows of spinules dorsally, but dorsal spinules are absent on the abdominal segments. The posterior spiracular openings are about 3 times as long as wide, and the spiracular hairs are in dorsal and ventral bundles of 8–17 hairs and lateral bundles of 4–12 hairs branched on the apical third. The anal lobes are large, protuberant and not grooved (Rodriguez *et al.*, submitted).

The eggs of *A. obliqua* are distinctive compared to most other species of *Anastrepha*. They bear a short lobe on the anterior end distal to the micropyle. Although the eggs have not been described for the majority of *Anastrepha* species, to date only that of *A. barbiellinii*, a non-pest, is known to have a similar short lobe.

## Adult

As for other *Anastrepha* species, adults of *A. obliqua* are easily separated from other tephritids by a simple wing venation character; vein  $M_1$ , the longitudinal vein that reaches the wing margin just behind the wing apex, curves strongly forward before meeting the costa on the wing margin without a visible angle. Furthermore, as is the case for most *Anastrepha* species, *A. obliqua* has a characteristic wing pattern composed of 3 orange and brown bands: the ‘C-band’ on the anterior margin from the base to near midlength; the ‘S-band’, a sideways S-shaped band from the wing base, curving forward across the middle of the wing (in *A. obliqua* usually narrowly connected to the C-band, but with a triangular marginal hyaline area between them), then running along the anterior margin to the wing apex; and the ‘V-band’, an inverted V-shaped band on the posterior apical half of the wing.

Identification to species is more difficult. It is essential to examine the aculeus (which is usually inside the oviscape, the basal tube-like part of the ovipositor) of a female specimen to achieve positive identification. The only comprehensive identification tool for *Anastrepha* is the online key by Norrbom *et al.* (2012). Adults, especially males, of *A. obliqua* are difficult to separate from those of *A. fraterculus* and various other similar species of the *fraterculus* group; if necessary, specimens should be referred to a specialist. Adult females of *A. obliqua* can be distinguished from those of other species of *Anastrepha* by the following combination of characters: Setae orange brown to dark red brown; mesopleuron and scutum without brown markings, without brown spot medially on scutellotergite; subscutellum entirely yellow to orange; mediotergite usually narrowly brown laterally; V-band proximal arm extending more than 1/3 distance from apex of vein  $M_4$  to apex of vein CuA+CuP; oviscape 1.5–1.9 mm long, 0.52–0.61 times mesonotum length; aculeus 1.30–1.75 mm long; tip 0.15–0.25 mm long, with distal 0.67–0.82 distinctly serrate and with lateral margin of serrate part slightly curved dorsally; 0.08–0.12 mm wide. Gravid females can be distinguished from similar pest species such as *A. fraterculus* by the lobe on the egg.

## Molecular

*Anastrepha obliqua* can be distinguished from many other species of *Anastrepha* based on differences in the DNA barcode region of the cytochrome oxidase I gene (Barr *et al.*, 2017a), but it cannot be distinguished from some species in the *fraterculus* group, including *A. fraterculus*, by this region. It can be distinguished from *A. suspensa* by differences in the ITS2 region (Barr *et al.*, 2017b). Ruiz-Arce *et al.* (2012) explored the phylogeography of *Anastrepha obliqua* using two mitochondrial genes (COI and ND6), and Passos *et al.* (2018) explored the genetic structure and diversity in Brazilian populations based on COI. Scally *et al.* (2016) investigated intra-specific relationships within *A. obliqua* using a multi-locus data set (7 nuclear and 2 mitochondrial loci).

## Detection and inspection methods

No specialized male lures are available for *Anastrepha* species. Monitoring for adults utilizes traps with protein-based or other ammonia-emitting lures, which are much less effective than the male lures used for various dacine fruit flies (Diaz-Fleischer *et al.*, 2009). McPhail traps baited with torula yeast, hydrolyzed protein, or other fermenting protein lures, or Multilure traps baited with ammonium acetate and putrescine are typically used for the capture of *Anastrepha* species (Thomas *et al.*, 2001; Adaime *et al.*, 2011).

## PATHWAYS FOR MOVEMENT

*Anastrepha* adults are capable of long-distance dispersal, thus natural movement is an important means of spread (Aluja *et al.*, 1999).

In international trade, the major means of fruit fly dispersal to previously uninfested areas is via transport of fruit containing live eggs or larvae. For the EPPO region, the most important imported fruit liable to carry *A. obliqua* is *Mangifera indica*, and to a lesser extent, various other hosts. There is also a risk of the transport of fruit fly puparia in soil or packaging.

## PEST SIGNIFICANCE

### Economic impact

*Anastrepha* species are the most serious fruit fly pests in the tropical Americas (Norrbom & Foote, 1989), along with the introduced *Ceratitis capitata* and *Bactrocera carambolae*. *Anastrepha obliqua* is considered the most important fruit fly pest in the West Indies, and it and *A. ludens* are the most significant pest fruit flies in Mexico and Central America, especially on mango (Whervin, 1974, Enkerlin *et al.*, 1989). In South America *A. obliqua* is second in importance in many areas only to the *A. fraterculus* complex and *Ceratitis capitata*.

### Control

Bait sprays, typically a mixture of Spinosad, malathion, or other insecticides and a food-based attractant, such as hydrolyzed yeast, are the most common type of chemical control for *A. obliqua* (Bateman, 1982; Roessler, 1989). Cultural practices, such as destroying all fallen and infested fruits, are also used. Soil drenches around host plants with appropriate pesticides are used to kill larvae and pupae during eradication programs (Stark *et al.*, 2014). Biological control has had limited success (Niklaus-Ruiz and Basedow, 1997, Ohashi *et al.*, 1997), but *Diachasmimorpha longicaudata* (Braconidae) continues to be mass reared and released in Mexico (Ramírez y Ramírez *et al.*, 2020). Sterile insect technique (SIT) is used for suppression and eradication in area-wide management programs to control *A. obliqua* in Mexico, primarily in the north to maintain fly free areas (Ramírez y Ramírez *et al.*, 2020).

### Phytosanitary risk

*Anastrepha obliqua* has a broad range of hosts and is a major pest throughout its range, especially on mango. It is invasive at least in the Lesser Antilles (CABI, 2008) and has been trapped in California, Florida, Texas and other states in the USA (Steck, 1991). Fu *et al.* (2014) modelled its potential geographic distribution and predicted its ability to establish throughout much of the tropical and subtropical areas of the world. It occurs primarily in lowland, tropical areas with hot climates, and is not capable of surviving the cold winters of the northern and central part of the EPPO region, thus the risk of establishment of *A. obliqua* is limited to the warmer southern parts of the EPPO region. Populations might enter and multiply during the summer months. In southern areas, some such populations might survive one or more winters, though in any case the direct losses from such introductions would probably not be high. The major risk for EPPO countries arises from the probable imposition of stricter phytosanitary restrictions on exported fruits (particularly to America and Japan) if any *Anastrepha* sp. enters and multiplies, even temporarily.

## PHYTOSANITARY MEASURES

Consignments of fruits of *Citrus* spp., *Eugenia* spp., *Mangifera indica*, *Prunus persica*, *Psidium* spp., *Spondias* spp., *Syzygium* spp., and other reported host plants from countries where *A. obliqua* occurs should be inspected for symptoms of infestation, and suspected infested fruits should be cut open to look for larvae. Such fruits should be imported from areas where *A. obliqua* does not occur or from a place of production found free from the pest by regular inspection for 3 months before harvest. Some fruits may be treated in transit by cold treatment (e.g., 13, 15 or 17 days at 0.5, 1.0 or 1.5°C, respectively), by hot water immersion (Nascimento *et al.*, 1992) (for mango, 46°C for 65 to 110 minutes depending on fruit size), by vapour heat (e.g., at 43°C for 4-6 h) (USDA, 2020), forced hot-air quarantine treatment (Mangan & Ingle, 1992), or irradiation. Ethylene dibromide was previously widely used as a fumigant but is now generally withdrawn because of its carcinogenicity. Methyl bromide is approved on a very limited basis; e.g., 1 treatment schedule (T101-j-2-1; 40 g/m<sup>3</sup> for 2 h at 21-29.5°C) is currently approved by USDA (2020) to treat oranges, tangerines and grapefruit from Mexico under pre-clearance. Irradiation at 70 gy is considered effective treatment for immature stages of *Anastrepha obliqua* (USDA, 2020).

Plants of host species transported with roots from countries where *A. obliqua* occurs should be free from soil, or the soil should not contain fruits or seeds or be treated to kill any puparia.

## REFERENCES

Adaime da Silva, R, Deus E da Glória de, Raga A, Pereira JDB, Souza-Filho MF de, Neto SV da Costa (2011) Monitoramento de moscas-das-frutas na Amazônia: Amostragem de frutos e uso de armadilhas. In: *Moscas-das-frutas na Amazônia brasileira: Diversidade, hospedeiros e inimigos naturais* (Ed. by Adaime da Silva, R.; Lemos, W. P.; Zucchi, R. A.), pp. 71–90. Embrapa Amapá, Macapá.

Aluja M, Piñero J, Jácome I, Díaz-Fleischer F, Sivinski J (1999) Behavior of flies in the genus *Anastrepha* (Trypetinae: Toxotrypanini). In: *Fruit flies (Tephritidae): Phylogeny and evolution of behavior* (Ed. by Aluja, M.; Norrbom, A. L.), pp. 375-406. CRC Press, Boca Raton. [16] + 944 p.

Barr NB, Ruiz-Arce R, Farris RE, Silva JG, Lima KM, Dutra VS, Ronchi-Teles B, Kerr PH, Norrbom AL, Nolazco N Thomas DB (2017a) Identifying *Anastrepha* (Diptera; Tephritidae) species using DNA barcodes. *Journal of Economic Entomology* **111**, 405–421.

Barr NB, Ruiz-Arce R, Obregón O, Shatters R, Norrbom AL, Nolazco N, Thomas DB (2017b) Diagnostic characters within ITS2 DNA support molecular identification of *Anastrepha suspensa* (Diptera: Tephritidae). *Florida Entomologist* **100**, 182-185.

Bateman MA (1982) Chemical methods for suppression or eradication of fruit fly populations. In: *Economic fruit flies of the South Pacific Region* (Ed. by Drew, R.A.I.; Hooper, G.H.S.; Bateman, M.A.) (2nd edition), pp. 115-128. Queensland Department of Primary Industries, Brisbane, Australia.

Birke A, Guillén L, Midgarden D, Aluja M (2013) Fruit flies *Anastrepha ludens* (Loew), *A. obliqua* (Macquart) and *A. grandis* (Macquart) (Diptera: Tephritidae): Three pestiferous tropical fruit flies that could potentially expand their range to temperate areas. In: *Potential Invasive Pests of Agricultural Crops* (Ed. by Peña, J.E.), pp. 192-213. CAB International, 440 p.

CABI (2008) *Anastrepha obliqua* (West Indian fruit fly) [original text by A. L. Norrbom]. In: *Invasive Species Compendium*. Wallingford, UK: CAB International. [www.cabi.org/isc](http://www.cabi.org/isc).

Carroll LE, White IM, Freidberg A, Norrbom AL, Dallwitz MJ, Thompson FC (2004) Pest fruit flies of the world. Identification, descriptions, illustrations, and information retrieval. *Diptera Data Dissemination Disk (CD-ROM)* **2**.

Christenson LD, Foote RH (1960) Biology of fruit flies. *Annual Review of Entomology* **5**, 171-192.

Diaz-Fleischer F, Arrendondo J, Flores S, Montoya P, Aluja M (2009) There is no magic fruit fly trap: multiple

biological factors influence the response to adult *Anastrepha ludens* and *Anastrepha obliqua* (Diptera: Tephritidae) individuals to Multilure traps baited with BioLure or Nulure. *Journal of Economic Entomology* **102**, 86-94.

Enkerlin D, Garcia R, Lopez MF (1989) Pest status; Mexico, Central and South America. In: *World Crop Pests 3(A). Fruit flies; their biology, natural enemies and control* (Ed. by Robinson, A.S.; Hooper, G.), pp. 83-90. Elsevier, Amsterdam, Netherlands.

Frías D, Hernández-Ortiz V, Vaccaro NC, Bartolucci AF, Salles, LA (2006) Comparative morphology of immature stages of some frugivorous species of fruit flies (Diptera: Tephritidae). *Israel Journal of Entomology* **35-36**, 423-457.

Fu L, Li Z-H, Huang G-S, Wu X-X, Ni W-L, Qu W-W (2014) The current and future potential geographic range of West Indian fruit fly, *Anastrepha obliqua* (Diptera: Tephritidae). *Insect Science* **21**, 234–244.

Greene CT (1934) A revision of the genus *Anastrepha* based on a study of the wings and on the length of the ovipositor sheath (Diptera: Tryptidae). *Proceedings of the Entomological Society of Washington*, **36**, 127-179.

Hedström I (1994) Population dynamics and host relationships of Neotropical fruit flies (Diptera: Tephritidae) in seasonal and non-seasonal environments. *International Journal of Pest Management* **39**, 400-410.

Lima AM da Costa (1934) Moscas de frutas do genero *Anastrepha* Schiner, 1868 (Diptera: Tryptidae). *Memórias do Instituto Oswaldo Cruz (Rio de Janeiro)*, **28**, 487-575.

Macquart JPM (1835) Histoire naturelle des Insectes. Diptères. Tome deuxième. Ouvrage accompagné de planches. In: Nouvelles suites a Buffon, formant, avec les oeuvres de cet auteur, un cours complet d'histoire naturelle. Collection accompagnée de planches (Ed. by Roret, N.E.), IV + 703 p. Paris. 82 vols. + 11 atlases.

Mangan RL, Ingle SJ (1992) Forced hot-air quarantine treatment for mangoes infested with West Indian fruit fly. *Journal of Economic Entomology* **85**, 1859-1864.

Ministerio de Desarrollo Agropecuario (2013) Proyecto de area libre (AL01): Azuero exporta libre de MoscaMed; Programa nacional moscas de la fruta monitoreos de detección (MD) y proyectos de exportación (PX) en la provincia de Chiriquí; Monitoreos de detección (MD) en otras provincias de la Republica de Panama. Informe tecnico para APHIS - USDA. 27 p.

Murillo T, Jirón LF (1994) Egg morphology of *Anastrepha obliqua* and some comparative aspects with eggs of *Anastrepha fraterculus*. *Florida Entomologist* **77**, 342-348.

Nascimento AS, Malavasi A, Morgante JS, Duarte ALA (1992) Hot water immersion treatment for mangoes infested with *Anastrepha fraterculus*, *A. obliqua* and *Ceratitis capitata*. *Journal of Economic Entomology* **85**, 456-460.

Niklaus-Ruiz Borge M, Basedow T (1997) A survey on the occurrence and flight periods of fruit fly species (Diptera: Tephritidae) in a fruit growing area in southwest Nicaragua, 1994/95. *Bulletin of Entomological Research* **87**(4), 405-412.

Norrbom AL (2004) Host plant database for *Anastrepha* and *Toxotrypana* (Diptera: Tephritidae: Toxotrypanini). *Diptera Data Dissemination Disk (CD-ROM)* **2**.

Norrbom AL, Foote RH (1989) Taxonomy and zoogeography; the taxonomy and zoogeography of the genus *Anastrepha* (Diptera: Tephritidae). In: *World Crop Pests 3(A). Fruit flies; their biology, natural enemies and control* (Ed. by Robinson, A.S.; Hooper, G.), pp. 15-26. Elsevier, Amsterdam, Netherlands.

Norrbom AL, Korytkowski CA, Zucchi RA, Uramoto K, Venable GL, McCormick J, Dallwitz MJ (2012) *Anastrepha* and *Toxotrypana*: Descriptions, illustrations, and interactive keys. <http://delta-intkey.com/anatox/intro.htm>.

Ohashi OS, Dohara R, Zucchi RA, Canal NA (1997) Occurrence of *Anastrepha obliqua* (Macquart) (Diptera: Tephritidae) on *Malpighia punicifolia* L. in Para state. *Anais da Sociedade Entomológica do Brasil* **26**(2), 389-390.

Passos JF, Nascimento DB, Menezes RST, Adaime R, Araujo EL, Lima KM, Zucchi RA, Ronchi Teles B,

Nascimento RR, Ruiz-Arce R, Barr NB, McPheron BA, Silva JG (2018) Genetic structure and diversity in Brazilian populations of *Anastrepha obliqua* (Diptera: Tephritidae). *PLoS ONE* **13** (12; e0208997), 14 p.

Ramírez y Ramírez F, Hernández Livera RÁ, Bello Rivera A (2020). El Programa Nacional de Moscas de la Fruta en México. In: *Moscas de la fruta: Fundamentos y procedimientos para su manejo* (Ed. by Montoya P, Toledo J, Hernández E), pp. 3-20. S y G editores, Ciudad de México.

Rodriguez EJ, Steck GJ, Moore MR, Norrbom AL, Sutton BD, Branham MA (2018) Description of larvae of *Anastrepha amplidentata* and *Anastrepha durantae* within the *fraterculus* group (Diptera: Tephritidae). *Proceedings of the Entomological Society of Washington* (submitted).

Roessler Y (1989) Control; insecticides; insecticidal bait and cover sprays. In: *World Crop Pests 3(B). Fruit flies; their biology, natural enemies and control* (Ed. by Robinson, A.S.; Hooper, G.), pp. 329-336. Elsevier, Amsterdam, Netherlands.

Ruiz-Arce R, Barr NB, Owen CL, Thomas BD, McPheron BA (2012) Phylogeography of *Anastrepha obliqua* inferred with mtDNA sequencing. *Journal of Economic Entomology* **105**, 2147-2160.

Scally M, Into F, Thomas DB, Ruiz-Arce R, Barr NB, Schuenzel EL (2016) Resolution of inter and intra-species relationships of the West Indian fruit fly *Anastrepha obliqua*. *Molecular Phylogenetics and Evolution* **101**, 286-293.

Schiner IR (1868) Diptera. In: *Reise der österreichischen Fregatte Novara um die Erde in den Jahren 1857, 1858, 1859, unter den Befehlen des Commodore B. von Wüllerstorf-Urbair*. Zoologischer Theil. Zweiter Band. 1. Abtheilung, [Sect.] B, [Art. I]. vi + 388 p. Karl Gerold's Sohn, Wien [= Vienna].

Seín F Jr (1933) *Anastrepha* (Trypetidae [sic], Diptera) fruit flies in Puerto Rico. *J. Dep. Agric. P. Rico*, **17**, 183-196.

Sharp, J.L. (1987) Laboratory and field experiments to improve enzymatic casein hydrolysate as an arrestant and attractant for Caribbean fruit fly, *Anastrepha suspensa* (Diptera: Tephritidae). *Florida Entomologist* **70**, 225-233.

Stark JD, Vargas RI, Souder SK, Fox AJ, Smith TR, Leblanc L, Mackey B (2014) Simulated field applications of insecticide soil drenches for control of Tephritid fruit flies. *Biopesticides International* **10**, 136-142.

Steck GJ (2001) Concerning the occurrence of *Anastrepha obliqua* (Diptera: Tephritidae,) in Florida. *Florida Entomologist* **84**, 320-321.

Steck GJ, Carroll LE, Celedonio-Hurtado H, Guillen-Aguilar J (1990) Methods for identification of *Anastrepha* larvae (Diptera: Tephritidae), and key to 13 species. *Proceedings of the Entomological Society of Washington* **92**, 333-346.

Steck GJ, Rodriguez EJ, Norrbom AL, Dutra VS, Ronchi-Teles B, Silva JG (2019) Review of *Anastrepha* (Diptera: Tephritidae) immature stage taxonomy. In: *Area-Wide Management of Fruit Fly Pests* (Ed. by Pérez-Staples, D.; Diaz-Fleischer, F.; Montoya, P.; Vera, T.), p. 57-88. CRC Press, Boca Raton.

Steyskal GC (1975) *Anastrepha obliqua* (Macquart) the prior name for *Anastrepha mombinpraeoptans* Sein (fruit flies, Tephritidae, Diptera). *United States Department of Agriculture Cooperative Economic Insect Report* **25**, 357-358.

Thomas DB, Holler TC, Heath RR, Salinas EJ, Moses AL (2001) Trap-lure combinations for surveillance of *Anastrepha* fruit flies (Diptera: Tephritidae). *Florida Entomologist* **84**, 344-351.

USDA (2020) *Treatment manual*. USDA/APHIS, Frederick, USA.

Whervin LW van (1974) Some fruitflies (Tephritidae) in Jamaica. *PANS* **20**, 11-19.

White IM, Elson-Harris MM (1992) *Fruit flies of economic significance, their identification and bionomics*. CAB International, Wallingford, UK.

Woodley NE, Hilburn DJ (1994) The Diptera of Bermuda. *Contributions of the American Entomological Institute* **28**

## ACKNOWLEDGEMENTS

This datasheet was extensively revised in 2020 by Allen L. Norrbom. His valuable contribution is gratefully acknowledged.

### How to cite this datasheet?

EPPO (2026) *Anastrepha obliqua*. EPPO datasheets on pests recommended for regulation. Available online. <https://gd.eppo.int>

### Datasheet history

This datasheet was first published in the EPPO Bulletin in 1983, revised in the two editions of 'Quarantine Pests for Europe' in 1992 and 1997, as well as in 2020. It is now maintained in an electronic format in the EPPO Global Database. The sections on 'Identity', 'Hosts', and 'Geographical distribution' are automatically updated from the database. For other sections, the date of last revision is indicated on the right.

CABI/EPPO (1992/1997) *Quarantine Pests for Europe (1<sup>st</sup> and 2<sup>nd</sup> edition)*. CABI, Wallingford (GB).

EPPO (1983) Data sheets on quarantine organisms No. 41, Trypetidae (non-European). *Bulletin OEPP/EPPO Bulletin* 13(1). <https://doi.org/10.1111/j.1365-2338.1983.tb01715.x>



Co-funded by the  
European Union