Anastrepha suspensa

Introduction

Anastrepha suspensa (Loew), also known as the Caribbean fruit fly only infests mature to overripe fruits. This pest is found mainly in the Greater & Lesser Antilles and Southern Florida. Primary hosts include- hogplum (*Spondias mombin),* tropical almond (*Terminalia catappá*), guava (*Psidium guajava),* Surińame cherry *Eugenia uniflora.*

Identity

Alies van Sauers-Muller MOA/CFF

Authority : Loew
Classification
- Kingdom : Animalia
- Phylum : Arthropoda
- Class : Insecta
- Order : Diptera
- Family : Tephritidae
- Genus : *Anastrepha*
- Species : *suspensa*
- Synonyms : *Trypeta suspensa* (Loew), 1862; *Anastrepha suspensa* (Loew), 186; (*Trypeta*) *Acrotoxa suspensa* (Loew), 1873; *Anastrepha unipuncta* (Sein), 1934; *Anastrepha longimacula* (Greene), 1934.
- Common names : Greater Antillean fruit fly, Caribfly, Guava fruit fly, Caribbean fruit fly, mosca-do-caribe.
- Role : Pest

Signs & Symptoms

Alies van Sauers-Muller MOA/CFF

Larvae can be found infesting fruits, especially citrus (grapefruit and orange). They feed on the pulp of the fruit causing early ripening and fruit fall.

Morphology

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Adult: Small to rather small, yellow-brown.(Fig 1) Mesonotum 2.28 - 2.86 mm long, yellow-brown, Humerus, median stripe widening posteriorly; lateral strip from transverse suture to scutellum, and scutellum

Fig 1. Adult Female: *Anastrepha suspensa*

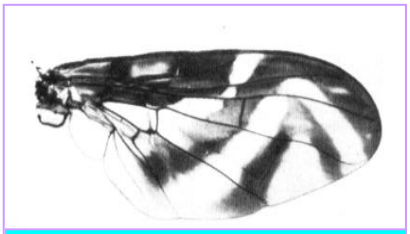

Fig 2. Wing: *Anastrepha suspensa*, (Stone, 1942)

paler; pleura yellow-brown; a stripe below notopleureon and most of metapleuron paler; metanotum entirely yellow-brown or darkened laterally, the dark area widest anteriorly. Macrochaetae dark-brown to black; pile yellow-brown. Sternopleural bristle usually rather strong. Wing (Fig.1) 4.9 - 6.4 mm long, the bands yellow-brown to brown; costal and **S** bands touching or rather narrowly separated at vein R4+5; **V** band complete, usually narrowly joined to **S** band; in a few males cell **M** infuscated.

Female Terminalia: Ovipositor sheath 1.6 - 1.9 mm. long, stout, tapering apically, the spiracles about 0.7 mm from base. Rasper of rather short hooks in five or six rows. Ovipositor 1.45 - 1.6 mm long, stout, the base widened, the tip distinctly narrowed beyond the oviduct, serrations rather rounded, occupying apical two-thirds of tip (Fig.3).

Male Terminalia: Tergal ratio about 0.8; clasper about 0.3 mm long, moderately stout basally, flattened apically, the apical portion rather narrow but the tip rounded; teeth about at middle (Stone, 1942).

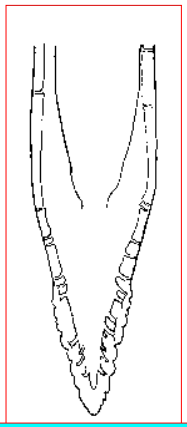

Fig. 3: Ovipositor *Anastrepha suspensa*. (Stone, 1942)

Biology & Ecology

Alies van Sauers-Muller MOA/CFF

A. suspensa infests only mature to overripe fruits. Eggs are laid singly and hatch in about 2-3 days; the larval feeding period occupies 10-14 days, and pupation about the same. These stages are prolonged in cool weather (Weems, 1965). *A. suspensa* is reported to oviposit only one egg per fruit and they mark the fruit with epideictic pheromones. Even so, multiple ovipositions by different females can result in a number of larvae occurring in the same fruit (Fletcher, 1989). Females lay about 200-400 each in laboratory studies. This is considerably less than under field conditions.

The maturity of the fruit (Citrus) has a great influence on the development rate and movement of larvae within the fruit. The rate of egg hatch in November (Florida) took from 6 - 12 days, while in February, hatch occurred within 4.6 days. Eggs, which were laid in the oil glands of the citrus fruit, have a higher mortality than those laid between the oil glands. During March, grapefruit in Florida is highly susceptible for fruit fly attack due to the maturity of the fruit (Calkins and Webb, 1988).

Female choice plays an important role in the mating system of the Caribbean fruit fly, *Anastrepha suspensa* (Loew). Males form aggregations (leks) on host plant foliage to which females come and apparently "shop" for mates. While on their leaf-territories, males broadcast visual, acoustic and pheromonal displays at least some of which seem to be advertisements of size; large size being a trait females prefer in a mate (Sivinski and Smittle, 1987; Sivinski and Burke, 1989). Males defend leaf territories with a mixture of postures, sounds, proboscis extensions and butting. Large size and prior residency are the major components of a successful defence.

Mating is concentrated in the late afternoon and early evening (Smith, 1989).

Dispersal/vectors

Alies van Sauers-Muller MOA/CFF

Artificial spread of the pest is caused by the movement of any article that may harbor the fly (as eggs, larvae, pupae, adults) from infested to uninfested areas. These articles include all *Anastrepha suspensa* host fruits and vegetables. *A. suspensa* enters uninfested areas when persons bring in prohibited exotic fruits infested with maggots, or when infested fruits and vegetables are shipped or mailed from areas where *A. suspensa* is established.

Management

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In Florida, although pesticide treatments have been shown to reduce fruit fly populations, attempts are being made to develop an integrated pest management approach using biological control techniques.

Sterile Insect Technique (SIT)

Biological control method which involves the release of large numbers of laboratory-reared sterile flies. This program is known as the Sterile Insect Technique (SIT). Mating between the lab-reared flies and the fertile wild flies interrupts the native population because offspring are not produced (Holler *et al*, 1993). SIT also holds promise for effective reduction of the Caribbean fruit fly in Florida. Millions of flies are produced each week at the Caribbean fruit fly mass-rearing facility in Gainesville.

Population suppression for the Caribbean fruit fly was obtained through releases in the 70s in Key West and in 1988 - 1990 in urban areas in combination with releases of the parasite *Diachasmimorpha longicaudata*.

Fly-Free Zones

Areas can fall under a protocol for certification of fruit without post-harvest treatment provided the fruit comes from specific fruit fly controlled areas (designated areas).

These areas must be maintained under certain sanitary conditions, including the removal of preferred hosts in and around the designated area. Second, trap surveys must be routinely conducted to ensure there are no Caribbean fruit flies in the area. If certification is based on negative trapping in early season (August-December), the area must be at least 300 acres and located 1.5 miles (3 miles for shipment to Japan) from residential or other areas containing preferred hosts (common guava, Cattley guava, Suriname cherry, rose apple and loquat). If certification is based on negative trapping in standard season (December 21- end harvest), the area must be at least 300 acres and located 3 miles from residential or other areas containing preferred hosts. It is the responsibility of the grower/participant to negotiate with the property owner for host removal. If certification is based on aerial bait sprays, a minimum of 40 acres will qualify as a designated area. There are several methods available for certification under bait-spray provisions depending on season. See Simpson (1993) for more information.

Temperature Treatments

Heat and cold temperature treatments can be used against fruit fly pests such as the Caribbean fruit fly. They include exposure to water or air >43ºC and exposure to cold (0-2.22ºC) (Sharp, 1993).

For export- fumigation with methyl bromide, cold treatment and shipment of fruit from fly-free areas are the means to overcome quarantine restrictions. In all cases, a large sample of fruit has to be examined by cutting, to determine the presence or absence of larvae. Tests have shown that larvae of Caribbean fruit flies make sounds while feeding, and these can be detected with a sound detector (Calkins and Webb, 1988), thus detecting infested fruit.

Resistant varieties

Research for avocado (Hennessey *et al.*, 2000) showed that certain varieties could be harvested mature without risk of infestation by Caribbean fruit flies. Ripe fruits are ranked low in resistance. Several varieties are highly resistant.

Biological Control

The following Braconids are recorded for *Anastrepha suspensa* (Baranowski *et al.*, 1993):

- *Diachasmimorpha longicaudata* (Ashmead) (in Florida, introduced from Hawaii)
- *Doryctobracon areolatus* (Szépligeti) (in Florida, introduced from Trinidad)
- *Psyttalia concolor* (Silvestri) (in Florida, introduced from France territory)
- *Trybliographa daci* Weld (in Florida, introduced from France territory)

The following Eulophid is recorded for *Anastrepha suspensa* in Florida:

- *Aceratoneuromyia indicum* (Silvestri) (introduced from Colombia and Costa Rica)

The solitary, endoparasitic braconid wasp, *Diachasmimorpha longicaudata* (Ashmead), parasitizes larvae of the Caribbean fruit fly (Fig. 4) and trapping data has indicated 40 percent reduction in Caribbean fruit fly populations. The wasp can detect its host i.e. the fruit fly larvae, through their feeding sounds and movements (Sivinski, 1987).

Fig. 4: Diachasmimorpha longicaudata parasitizing *Anastrepha suspensa* larvae

Host notes

Norrbom and Kim (1988)

Host records are cited according to Norrbom and Kim (1988), Von Windeguth *et al* (1973) and Vásquez *et al.*, (2000).

The following fruits are infested by *A. suspensa*: - *Mangifera indica* (mango); *Spondias mombin* (hog plum; jobo); *Annona squamosa; Carica papaya*; *Chrysobalanus icaco*; *Terminalia catappa* (tropical almond); *Casearia hirsuta* Sw; *Flacourtia indica* (Burm.f.) (governor's plum); *Persea americana* (avocado); *Malpighia glabra* (Barbados cherry); *Psidium guajava* (guava); *Coffea arabica* (coffee); *Litchi chinensis Manilkara zapota* (*Achras sapota*) (sapodilla); *Capsicum annuum* (bell pepper) *Lycopersicon esculentum.*

Lemons are virtually immune, oranges highly resistant and grapefruit are initially somewhat resistant at least before becoming senescent (Greany *et al*., 1993)

Inspection procedures: See *A. ludens*

Distribution

Alies van Sauers-Muller MOA/CFF

Southern Florida, Puerto Rico, Cuba, Jamaica and Hispaniola (Stone, 1942; Weems, 1965) (Fig. 5).

Fig. 5: Distribution
Anastrepha suspensa
(Malavasi and Zucchi, 2000)

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WEB RESOURCE

http://creatures.ifas.ufl.edu/fruit/tropical/caribbean_fruit_fly