

## Data Sheets on Quarantine Pests

*Anastrepha suspensa***IDENTITY****Name:** *Anastrepha suspensa* (Loew)**Synonyms:** *Acrotoxa suspensa* Loew  
*Anastrepha longimacula* Greene  
*Anastrepha unipuncta* Seín  
*Trypeta suspensa* (Loew)**Taxonomic position:** Insecta: Diptera: Tephritidae**Common names:** Caribbean fruit fly, greater Antillean fruit fly (English)**Bayer computer code:** ANSTSU**EPPO A1 list:** No. 200**EU Annex designation:** I/A1**HOSTS**

The preferred hosts are Myrtaceae, especially *Eugenia*, guavas (*Psidium guajava*) and *Syzygium*. The species is also a pest of *Annona* spp. and *Terminalia catappa*. *Citrus* spp. are not normally significant hosts, but *A. suspensa* is sometimes found on overripe citrus fruits. *Citrus limon* (lemons) and *C. aurantiifolia* (limes) are not hosts. Like other *Anastrepha* spp., *A. suspensa* has been recorded incidentally on a wider range of fruits, both tropical and temperate, but these records are incidental occurrences, of no economic significance.

**GEOGRAPHICAL DISTRIBUTION****EPPO region:** Absent.**North America:** Bahamas, USA (found but not established in California; Florida).**Central America and Caribbean:** Cuba, Dominican Republic, Haiti, Jamaica, Puerto Rico.**EU:** Absent.**BIOLOGY**

As in *Anastrepha* spp. generally, eggs are laid below the skin of the host fruit and hatch within 3-12 days. The larvae feed for another 15-32 days. Pupariation is in the soil under the host plant and adults emerge after 15-19 days (longer in cool conditions); adults occur throughout the year (Christenson & Foote, 1960).

**DETECTION AND IDENTIFICATION****Symptoms**

Attacked fruit can show signs of oviposition punctures, but these, or any other symptoms of damage, are often difficult to detect in the early stages of infestation. Much damage may

occur inside the fruit before external symptoms are seen, often as networks of tunnels accompanied by rotting.

## **Morphology**

### **Larva**

In general it is not possible to identify *Anastrepha* spp. with certainty from larval characteristics. Described by Steck *et al.* (1990) and White & Elson-Harris (1992), the larva of *A. suspensa*, like *Anastrepha* larvae in general, is whitish, up to 12 mm in length, feeding in the flesh of the fruits. The two mouth hooks are strongly developed and equal in size. The body is tapered anteriorly and truncated at the posterior end. Each posterior spiracle has three openings or slits arranged parallel or converging, on a sclerotized plate. The larva of *A. suspensa* differs from that of *A. obliqua* (EPPO/CABI, 1996a) in lacking the heavy sculpture on the surface of the anal lobes; it differs from *A. fraterculus* in the shape of the teeth on the oral ridges.

### **Adult**

*A. suspensa*, like *Anastrepha* spp. in general, is easily separated from other tephritids by a simple wing venation character; the vein that reaches the wing margin just behind the wing apex curves forwards before joining the wing margin. Furthermore, most *Anastrepha* spp. have a very characteristic wing pattern; the apical half of the wing has two inverted 'V'-shaped markings, one fitting within the other; and a stripe along the forward edge of the wing which runs from near the wing base to about half-way along the wing length.

Identification to species is more difficult. In particular, it is essential to dissect the aculeus (ovipositor piercer) of a female specimen to achieve positive identification. The adult of *A. suspensa* is very similar to those of *A. fraterculus* and *A. obliqua* (EPPO/CABI, 1996a), but differing in the following characters: apical section of S band touching, or almost touching, vein M; thorax usually with a distinct black spot across the centre of the suture between the scutum and scutellum.

## **Detection and inspection methods**

No male lures have yet been identified for *Anastrepha* spp. However, they are captured by traps emitting ammonia and it is likely that traps already set for *Rhagoletis cerasi* in the cherry-growing areas of the EPPO region may attract *Anastrepha* spp. if they should ever occur in those areas. McPhail traps are usually used for the capture of *Anastrepha* spp. (see Drew, 1982 for trap details) and possible baits are ammonium acetate (Hedstrom & Jimenez, 1988), casein hydrolysate (Sharp, 1987) and torula yeast (Hedstrom & Jiron, 1985). The number of traps required per unit area is high; in a release and recapture test Calkins *et al.* (1984) placed 18 traps per 0.4 ha and only recovered about 13% of the released flies.

## **MEANS OF MOVEMENT AND DISPERSAL**

There is evidence that adults of *Anastrepha* spp. can fly for as far as 135 km (Fletcher, 1989) and therefore natural movement is an important means of spread.

In international trade, the major means of dispersal to previously uninfested areas is the transport of fruits containing live larvae. For the EPPO region, the most important fruits liable to carry *A. suspensa* are *Annona*, *Psidium guajava*, and possibly overripe *Citrus*. The various tropical fruit hosts which may be locally important in America are little traded to Europe. There is also a risk from the transport of puparia in soil or packaging with plants which have already fruited.

## PEST SIGNIFICANCE

### Economic impact

*Anastrepha* spp. are the most serious fruit fly pests in the tropical Americas (Norrbon & Foote, 1989), with the possible exception of the introduced *Ceratitis capitata* (EPPO/CABI, 1996b). *A. suspensa* is primarily a pest of guava and other Myrtaceae (White & Elson-Harris, 1992). It is recorded from *Citrus* spp., but only in some areas and there is evidence that only very ripe fruits are attacked. The fact that it occurs in southern Florida (USA) has given it particular importance (Greany *et al.*, 1993).

### Control

Control can be considerably aided by good cultural practices, for example by gathering all fallen and infected host fruits, and destroying them. Insecticidal protection is possible by using a cover spray or a bait spray. Malathion is the usual choice of insecticide for fruit fly control and this is usually combined with protein hydrolysate to form a bait spray (Roessler, 1989); practical details are given by Bateman (1982). Bait sprays work on the principle that both male and female tephritids are strongly attracted to a protein source from which ammonia emanates. Bait sprays have the advantage over cover sprays that they can be applied as a spot treatment so that the flies are attracted to the insecticide and there is minimal impact on natural enemies. Possibilities for biological control of *A. suspensa* in Florida have been reviewed by Baranowski *et al.* (1993). Inundative releases of the braconid *Biosteres longicaudatus* are being considered.

Pest-free areas can be established for *A. suspensa*. In Florida, the Caribbean Fruit Fly Protocol provides a body of quarantine regulations, establishing specific *A. suspensa* controlled areas (designated areas) from which fresh fruits may be certified for export (Simpson, 1993). Calkins (1993) believes that control of *A. suspensa* in Florida can reduce it to insignificant importance.

### Phytosanitary risk

*A. suspensa* has recently been added to the EPPO A1 list, on which *A. fraterculus*, *A. ludens* and *A. obliqua* previously appeared under the broad category "non-European Trypetidae" (OEPP/EPPO, 1983). *A. suspensa* is also a quarantine pest for CPPC, JUNAC and NAPPO.

*A. suspensa*, like the other *Anastrepha* spp., derives from tropical wet forest habitats; the northern and central part of the EPPO region would not have sufficiently high temperatures for its survival, whereas most of the warmer southern parts of the EPPO region would probably be too arid for it to become widely established. Thus, the direct risk of establishment of *A. suspensa* in most of the EPPO region is minimal, though populations might enter and multiply during the summer months. In southern areas, some such populations might survive one or several winters, but the direct losses from such introductions would probably not be high because the preferred hosts of *A. suspensa* are not cultivated in the EPPO region. The major risk for EPPO countries arises from the probable imposition of much 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 *Annona*, *Citrus*, *Fortunella*, *Malus*, *Mangifera indica*, *Prunus domestica*, *Prunus persica* and *Psidium guajava* from countries where *A. suspensa* occurs should be inspected for symptoms of infestation and those suspected should be cut open in order to look for larvae. EPPO recommends that such fruits should come from an area

where *A. suspensa* does not occur, or from a place of production found free from the pest by regular inspection for 3 months before harvest. Fruits may also be treated in transit by cold treatment (e.g. 13, 15 or 17 days at 0.5, 1 or 1.5°C, respectively) or, for certain types of fruits, by vapour heat (e.g. keeping at 43°C for 4-6 h) (Hallman, 1990; USDA, 1994), or forced hot-air (Sharp & Hallman, 1992; Sharp, 1993), or hot-water immersion (Gould & Sharp, 1992). Temperature treatments specifically cited against *A. suspensa* include exposure to water or air >43°C and exposure to cold (0-2.22°C) (Sharp *et al.*, 1993). Ethylene dibromide was previously widely used as a fumigant but is now generally withdrawn because of its carcinogenicity; methyl bromide is less satisfactory, damaging many fruits and reducing their shelf life, but treatment schedules are available (e.g. 40 g/m<sup>3</sup> for 2 h at 21-29.5°C; Hallman & King, 1992; USDA, 1994). Gamma-ray irradiation has also been investigated as a quarantine treatment against *A. suspensa* (Gould & Windeguth, 1991), while use of heat-shrinkable film to wrap mangoes is not an adequate treatment (Gould & Sharp, 1990).

Plants of host species transported with roots from countries where *A. suspensa* occurs should be free from soil, or the soil should be treated against puparia, and should not carry fruits. Such plants may indeed be prohibited importation.

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