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Data Sheets on Quarantine Pests

Anastrepha fraterculus

IDENTITY

Name: *Anastrepha fraterculus* (Wiedemann)
Synonyms: *Acrotoxa fraterculus* (Wiedemann)
Anastrepha braziliensis Greene
Anastrepha peruviana Townsend
Anastrepha soluta Bezzi
Anthomyia frutalis Weyenburgh
Dacus fraterculus Wiedemann
Tephritis mellea Walker
Trypeta fraterculus (Wiedemann)
Trypeta unicolor Loew
Taxonomic position: Insecta: Diptera: Tephritidae
Common names: South American fruit fly (English)
Mouche des fruits sud-américaine (French)
Mosca de la ciruela (Spanish)
Bayer computer code: ANSTFR
EPPO A1 list: No. 229
EU Annex designation: I/A1

HOSTS

The preferred hosts are Myrtaceae, particularly the native American guava (*Psidium guajava*). The most frequent introduced hosts in Mexico are *Syzygium jambos* and *Terminalia catappa* (Hernandez-Ortiz, 1992). In Brazil, mangoes (*Mangifera indica*) and apples (*Malus pumila*) are important hosts. *Citrus* and *Prunus* spp., especially peaches (*P. persica*), are noted as occasional hosts. The geographical range of *A. fraterculus* extends furthest out of the tropics, so that its behaviour on temperate fruit crops is less conjectural than for the other species. Like other *Anastrepha* spp., *A. fraterculus* 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: Mexico, USA (southern Texas). The form of the species present in North America is possibly different from those in South America.
Central America and Caribbean: Costa Rica, Guatemala, Panama, Trinidad and Tobago.
South America: Argentina, Bolivia, Brazil (Bahía, Espirito Santo, Paraná, Rio de Janeiro, Rio Grande do Sul, Santa Catarina, São Paulo), Chile, Colombia, Ecuador (including the Galapagos Islands), Guyana, Paraguay, Peru, Suriname, Uruguay, Venezuela.
EU: Absent.

Distribution map: See CIE (1958, No. 88).

BIOLOGY

As in *Anastrepha* spp. generally, eggs are laid below the skin of the host fruit. They hatch within 3-6 days and the larvae feed for another 15-20 to 20-25 days (according to temperature). 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). They have no winter diapause or quiescence in more temperate areas such as southern Brazil (Salles, 1993). Reproductive behaviour in the laboratory and field has been studied by Lima *et al*. (1994).

Isozyme analysis of 8 populations of *A. fraterculus* from different parts of its range has revealed sharp genetic discontinuities (Steck, 1991). Populations from northeastern Brazil, coastal Venezuela, Costa Rica and Mexico were all very similar. Populations from southern Brazil, Andean Venezuela and Peru were genetically distinct from the first group and possibly from each other as well. It is suggested that the nominal species *A. fraterculus* is in fact a complex of cryptic species.

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. Descriptions of the larva of *A. fraterculus* are provided by Berg (1979), Weems (1980), Steck *et al*. (1990) and White & Elson-Harris (1992). As in other *Anastrepha* spp., the larva is whitish, up to 12 mm in length, usually 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. fraterculus* is difficult to distinguish from that of *A. obliqua*, but can be separated from that of *A. ludens* by having usually eight or nine buccal carinae instead of twelve and by having a single line of caudal papillae, above and below the posterior spiracles, instead of two lines. The larva of *A. suspensa* differs from that of *A. fraterculus* in the shape of the teeth on the oral ridges.

Adult

A. fraterculus, like other *Anastrepha* spp., 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. fraterculus* is very difficult to separate from that of *A. obliqua*; if necessary, specimens should be referred to a specialist. The following description applies to both species.

Colour: scutum without any silvery or hoary patterning; base of scutellum and posterior margin of scutum without a black mark; apical section of vein M (beyond dm-cu crossvein) crossed by an oblique marking; in cell r4+5 this marking often joins the marking on crossvein dm-cu to form an inverted V-shaped band (known as the V-band). Abdomen: aculeus tip serrate and less than 0.18 mm wide; aculeus at most 2.0 mm long. Wing length 5-7 mm.

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 fruit containing live larvae. For the EPPO region, the most important fruits liable to carry *A. fraterculus* are *Mangifera indica* and *Psidium guajava*, and also *Citrus*, *Malus* and *Prunus*. 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 (Norrbom & Foote, 1989), with the possible exception of the introduced *Ceratitis capitata* (EPPO/CABI, 1996). *A. fraterculus* is an important pest of guavas (and locally significant Myrtaceae) and mangoes, and also to some extent of *Citrus* and *Prunus* spp. (Hernandez-Ortiz, 1992; White & Elson-Harris, 1992).

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. The toxicity to *A. fraterculus* of different insecticides used in baits was recently compared by Salles (1995).

Phytosanitary risk

EPPO lists *A. fraterculus* as an A1 quarantine pest (OEPP/EPPO, 1983) within the broad category "non-European Trypetidae"; it is also of quarantine significance to APPPC, CPPC and NAPPO.

Anastrepha fraterculus, 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. fraterculus* 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, though in any case the direct losses from such introductions would probably not be high. *A. fraterculus*, which extends further south in South America, probably presents a more substantial danger than the other, more tropical, species of the genus. 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. fraterculus* 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. fraterculus* 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) (USDA, 1994), or by hot water immersion (Nascimento *et al*., 1992). 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^3 for 2 h at 21-29.5°C; USDA, 1994).

Plants of host species transported with roots from countries where *A. fraterculus* 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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