

Data Sheets on Quarantine Pests

Rhagoletis cingulata and *Rhagoletis indifferens***IDENTITY**• *Rhagoletis cingulata***Name:** *Rhagoletis cingulata* (Loew)**Synonyms:** *Trypeta cingulata* Loew**Taxonomic position:** Insecta: Diptera: Tephritidae**Common names:** Eastern cherry fruit fly, cherry fruit fly, North American cherry fruit fly (English)**Notes on taxonomy and nomenclature:** *R. cingulata* and *R. indifferens* are very closely related allopatric species, occurring respectively in the eastern and western parts of North America. Before 1966, only *R. cingulata* was generally recognized, and most pre-1966 literature did not make any distinction between the two species. As a consequence, all records of *R. cingulata* in western North America refer to *R. indifferens*.**Bayer computer code:** RHAGCI**EPPQ A1 list:** No. 239**EU Annex designation:** I/A1• *Rhagoletis indifferens***Name:** *Rhagoletis indifferens* Curran**Synonyms:** *Rhagoletis cingulata* subsp. *indifferens* Curran**Taxonomic position:** Insecta: Diptera: Tephritidae**Common names:** Western cherry fruit fly (English)**Bayer computer code:** RHAGIN**EPPQ A1 list:** No. 242**EU Annex designation:** I/A1**HOSTS**

The principal cultivated hosts of *R. cingulata* are cherries (*Prunus avium* and *P. cerasus*), and would be so in the EPPQ region. *R. indifferens* also principally infests *P. avium*, but also *P. salicina* and other minor cultivated *Prunus* spp. (Bush, 1966); there is only a single record of *R. indifferens* from *P. cerasus* (Foote & Blanc, 1963). Though *R. cingulata* rarely attacks wild *Prunus* spp., *R. indifferens* is commonly found on *P. emarginata* (Banham, 1971). In the EPPQ region, *P. avium* and *P. salicina* would be the main potential hosts.

GEOGRAPHICAL DISTRIBUTION• *Rhagoletis cingulata***EPPQ region:** Absent.**North America:** Canada (Manitoba, New Brunswick, Newfoundland, Nova Scotia, Ontario, Prince Edward Island, Quebec, Saskatchewan), Mexico, USA (Alabama, Arizona, Arkansas, Connecticut, Delaware, Florida, Georgia, Iowa, Illinois, Indiana, Louisiana, Massachusetts, Maryland, Maine, Michigan, Mississippi, North Carolina, Nebraska, New

Hampshire, New Jersey, New York, Ohio, Pennsylvania, South Carolina, Tennessee, Texas, Virginia, Vermont, Wisconsin, West Virginia).

EU: Absent.

Distribution map: See CIE (1990a, No. 159), Foote *et al.* (1993).

• ***Rhagoletis indifferens***

EPPO region: Switzerland - light-trapping reports from the Ticino area of two males of *R. indifferens* (1983 and 1987; Merz, 1991). This species seems to have established in the region, but at a low population density. There are no reports of it as a pest, possibly because it faces major competition from the abundant indigenous *R. cerasi*. It may be, nevertheless, that the A1 status of *R. indifferens* will have to be reviewed. It may be noted that another species of North American origin, *R. completa*, appeared in Switzerland in similar circumstances and has now established in Switzerland and northern Italy (EPPO/CABI, 1996); it has been reclassified as an A2 quarantine pest.

North America: Canada (south-eastern British Columbia), USA (Arizona, California, Colorado, Idaho, Montana, New Mexico, Oregon, Utah, Washington, Wyoming).

EU: Absent.

Distribution map: See CIE (1990b, No. 513), Foote *et al.* (1993).

BIOLOGY

Eggs are laid below the skin of the host fruit and hatch after 3-7 days. The larvae usually feed for 2-5 weeks. Pupariation is in the soil under the host plant and this is the normal overwintering stage. Adults may live for up to 40 days under field conditions (Christenson & Foote, 1960).

DETECTION AND IDENTIFICATION

Symptoms

Attacked fruit will be pitted by oviposition punctures, around which some discoloration usually occurs.

Morphology

Separation of *R. cingulata* and *R. indifferens* (Bush, 1966) is difficult morphologically and should be referred to a specialist.

Larva

See Benjamin (1934) and Phillips (1946).

Adult

Head: Three pairs of frontal setae; genae usually less than one-quarter eye height; ocellar setae long, usually similar in length and strength to orbital setae; two pairs of orbital setae; 1st flagellomere usually with a small antero-apical point.

Thorax: Scutum predominantly black, with four longitudinal bars of tomentum that form grey stripes; scutum with dorsocentral setae based close to a line between the anterior supra-alar setae; scutum with dorsocentral setae and presutural supra-alar setae; anatergite without long pale hairs, at most with a fine pubescence; scutellum flat and with four marginal setae (one basal and an apical pair), black at base and sides, with basal and lateral black areas broadly joined; basal scutellar setae based well within black area.

Wing: Vein Sc abruptly bent forward at nearly 90°, weakened beyond this bend and ending at subcostal break; vein R1 with dorsal setulae; vein R4+5 usually without dorsal setulae, except sometimes at the base of the vein (except in some aberrant individuals); apex of vein M meeting C with a distinct angle; cup extension short, never more than one-fifth as long as vein A1+Cu2, and vein CuA2 straight along anterior edge of cup extension; cell cup always considerably broader than half depth of cell bm, and usually about as deep as cell

bm; in *R. cingulata* and *R. indifferens*, cells r1 and r2+3 without any markings between the discal and preapical crossbands; apical crossband usually only divided at apex, leaving an oblique hyaline stripe across the apex of cell r4+5; apical crossband adjoining vein C. Length 3-4 mm.

Abdomen: Predominantly black; female with an ovipositor that is shorter than the wing length, and straight.

Detection and inspection methods

Traps already in use within the EPPO region for *R. cerasi* should be suitable for monitoring any invasion of North American *Rhagoletis* spp. They capture both sexes and are based on visual, or visual plus odour, attraction. They are coated in sticky material. Traps are usually either flat-surfaced and coloured fluorescent yellow to elicit a supernormal foliage response, or spherical and dark-coloured to represent a fruit; traps which combine both foliage and fruit attraction can also be used. The odour comes from protein hydrolysate or other substances emitting ammonia, such as ammonium acetate. See Boller & Prokopy (1976) and Economopoulos (1989) for a discussion of these traps. Burditt (1988) has evaluated different traps for catching *R. indifferens* in British Columbia (Canada).

MEANS OF MOVEMENT AND DISPERSAL

Adult flight and the transport of infected fruits are the major means of movement and dispersal to previously uninfected areas. In general, *Rhagoletis* spp. are not known to fly more than a short distance; *R. indifferens* has been recorded moving up to 100 m in the presence of hosts (Fletcher, 1989). In international trade, the major means of dispersal to previously uninfested areas is the transport of fruits containing live larvae. There is also a risk from the transport of puparia in soil or packaging with plants which have already fruited.

PEST SIGNIFICANCE

Economic impact

R. cingulata and *R. indifferens* are important pests of cherries in North America.

Control

Control procedures already established in the EPPO region for *R. cerasi* are similar to those used against the North American pest species and could therefore be implemented against any outbreak of those species within the EPPO region. Upon detection, fallen and infected fruit must be removed and destroyed. If possible, wild and abandoned host trees should also be destroyed. Boller & Prokopy (1976) note that systemic organophosphates, such as dimethoate, are highly effective against most species, killing eggs, larvae and adults. Recently, Belanger *et al.* (1985) discussed the use of pyrethroids, but these were only of use when pest activity was low. More environmentally acceptable techniques have been tried; namely bait sprays (insecticide plus ammonia source) which can be applied as a spot treatment; soil application of insecticide to destroy pupae; and juvenile hormone analogues which can be applied to the soil (Boller & Prokopy, 1976).

Phytosanitary risk

The EPPO A1 quarantine list category "non-European Trypetidae" (OEPP/EPPO, 1983) includes *R. cingulata* and *R. indifferens*. EPPO's original documentation of this category concerned only *Rhagoletis* spp. in North America; the tropical tephritids were added to the data sheet only at a late stage. Thus, the temperate fruit flies are the obvious direct quarantine pests for the EPPO region. There is a European cherry fruit fly (*R. cerasi*), but introduction of *R. cingulata* and *R. indifferens* (or of the third North American tephritid

pest of cherries, *R. fausta*; EPPO/CABI, 1996) would present a significant danger. *R. cingulata* is also a quarantine pest for OIRSA.

The recent capture of isolated individuals of *R. indifferens* in Switzerland may provide an opportunity to discover whether these species have any pest potential in Europe.

PHYTOSANITARY MEASURES

Consignments of cherries (*Prunus avium*, *P. cerasus*) and of *P. salicina* from countries where *R. cingulata* or *R. indifferens* occur 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 *R. cingulata* and *R. indifferens* do not occur, or from a place of production found free from these pests by regular inspection for 3 months before harvest. Fruits may also be treated, but specific treatment schedules have mostly not been developed for *Rhagoletis* spp., since there is no need for them in North America. Schedules developed for other fruit flies on cherries will probably be adequate, e. g. treatment in transit by cold treatment (e.g. 11, 12 or 14 days at 0.5, 1 or 1.5°C, respectively) (USDA, 1994). 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. 32 g/m³ for 2 h at 21-29.5°C, followed by a cold treatment at 0.5-3°C for 4 days; USDA, 1994). Irradiation has been successfully tested as a quarantine treatment against *R. indifferens* (Burditt & Hungate, 1988).

Plants of host species transported with roots from countries where *R. cingulata* or *R. indifferens* occur 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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