

Factsheet *Ceratitis cosyra* (Walker)

Original name: *Trypeta cosyra* Walker, 1849: 1042.

Vernacular name: Mango fruit fly, marula fruit fly

Formal redescription (after De Meyer, 1998)

Body length: 4.43 (3.35 - 5.40) mm; wing length: 4.17 (3.40-5.20) mm.

Male

Head. Antenna yellow-orange. Third antennal segment twice as long as second segment. Arista with short hairs over entire length. Frons with short scattered hairs which are distinctly darker than or same colour as frons; more flattened, not distinctly convex, in lateral view slightly projecting forwards at antennal implant. Lower eye margin with slightly darker marking. Chaetotaxy normal for subgenus, bristles dark reddish to black.

Thorax. Postpronotum white, with black spot. Ground colour of mesonotum pale with orange tinge; mesonotal pattern variable especially spots at mesal end of suture and prescutellar spots variable in size and colouration, anterior supra-alar spots usually continuous. Chaetotaxy normal for subgenus. Scapular setae pale. One anepisternal bristle. Scutellum white basally, otherwise yellow with three black separate markings apically; basally usually with two separate dark spots, sometimes spots not outspoken, and only present as slightly brown patches. Subscutellum pale with three dark separate spots except along dorsal margin where touching.

Legs yellow; setation typical for subgenus, mainly pale especially on femora. Posterior and posterodorsal rows on fore femur pale. Ventral spines on fore femur yellowish or black.

Wing bands with markings extensively yellow; banding sometimes faint. Banding, marginal band continuous; cubital band free; medial band absent; crossvein r-m before middle of discal cell. Crossvein dm-cu position variable.

Abdomen. Pale yellow or more brownish. Setation and banding typical for subgenus.

Female

As male except for the following characters: Oviscape shorter than abdominal terga 3-6 combined.

Remark: black spots on thorax may vary in size and presence. See Virgilio et al (2017) for a more detailed discussion on this variability and the possibility of *Ceratitis cosyra* being a species complex. Currently all different forms are considered one and the same species.

Encyclopedia of Life link: <http://eol.org/pages/724070/overview>

DNA barcoding

Multiple reference DNA barcodes from the species distribution are available on the Barcode of Life Data Systems (BOLD) at:

http://www.boldsystems.org/index.php/Taxbrowser_Taxonpage?taxon=Ceratitis+cosyra&searchTax=

A recent analysis indicated the occurrence of cryptic genetic variation within *C. cosyra* and called into question the morphological diagnosis currently implemented to separate *C. cosyra* from *C. striatella* (Virgilio et al. 2017). Therefore, the presence of possibly misidentified reference vouchers of *C. cosyra* / *C. striatella* might bias the reliability of DNA barcoding identification for these two species.

Biology

Ceratitis cosyra can complete its life cycle in about 23 days at temperatures ranging from 26°C and 30°C (Grout & Stoltz, 2007). Adults can live up to 8 weeks (Manrakhan & Lux, 2006). Females start laying eggs in fruit 2 weeks after adult emergence. Eggs are laid under the fruit skin. Eggs are usually white to creamy yellow in colour. The area on the fruit skin where eggs are laid usually becomes discoloured. Eggs hatch into larvae which feed on the fruit pulp. Larvae are cream coloured. There are three larval instars. The larval duration of *C. cosyra* varies between 10 and 14 days at 28°C (Ekesi et al. 2009). Fully fed larvae burrow into the soil where they pupate. Pupation usually takes place within 24 H after the larvae leave the fruit (Malio, 1979). The pupal stage lasts for 9 to 10 days at temperatures ranging from 26° to 30° C (Grout & Stoltz, 2007), after which an adult fly emerges and the cycle continues.

Host plant list

One of the main fruit fly pests found on mango (for example see Vayssières et al., 2015) but largely displaced by the invasive *Bactrocera dorsalis* from this host (Ekesi et al., 2009). Detailed studies on host range can be found for Kenya (Copeland et al., 2006), and Tanzania (Mwatawala et al., 2009). Throughout its range it is recorded from the hosts listed in the table below.

PlantFamily	PlantLatinName	PlantCommonNameEnglish
Anacardiaceae	Anacardium occidentale	cashew nut
Anacardiaceae	Mangifera indica	mango
Anacardiaceae	Sclerocarya birrea	maroola plum
Anacardiaceae	Sclerocarya sp.	
Anacardiaceae	Spondias mombin	tropical plum
Anacardiaceae	Spondias sp.	wild plum
Anisophylleaceae	Anisophyllea laurina	
Annonaceae	Annona cherimola	cherimoya
Annonaceae	Annona muricata	soursop
Annonaceae	Annona reticulata	custard apple
Annonaceae	Annona senegalensis	wild custard apple
Annonaceae	Annona sp.	
Annonaceae	Rollinia mucosa	wild sweetsop
Annonaceae	Rollinia sp.	
Apocynaceae	Carissa carandas	
Apocynaceae	Landolphia kirkii	

Apocynaceae	Landolphia sp.	
Apocynaceae	Saba comorensis	
Apocynaceae	Saba senegalensis	Saba nut
Apocynaceae	Tabernaemontana penduliflora	
Arecaceae	Areca alicae	
Canellaceae	Warburgia salutaris	pepper-bark tree
Canellaceae	Warburgia sp.	
Chrysobalanaceae	Chrysobalanus sp.	
Combretaceae	Terminalia catappa	tropical almond
Ebenaceae	Diospyros mespiliformis	
Euphorbiaceae	Drypetes gossweileri	
Euphorbiaceae	Uapaca kirkiana	wild loquat
Fabaceae	Cordyla africana	wild mango
Fabaceae	Cordyla pinnata	cayor pear tree
Flacourtiaceae	Dovyalis caffra	kei apple
Flacourtiaceae	Flacourtia sp.	
Lauraceae	Persea americana	avocado
Loganiaceae	Strychnos spinosa	
Myrtaceae	Eugenia uniflora	surinam cherry, pitanga cherry
Myrtaceae	Psidium guajava	common guava
Myrtaceae	Psidium sp.	
N/A	(Unknown)	
Passifloraceae	Adenia lobata	
Polygalaceae	Carpolobia lutea	
Rubiaceae	Sarcocephalus exculentus	African peach
Rubiaceae	Sarcocephalus latifolius	Guinea peach
Sapotaceae	Englerophytum natalense	
Sapotaceae	Vitellaria paradoxa	shea butter

Additional information on host records and associated specimens can be found on :
<http://projects.bebif.be/fruitfly/taxoninfo.html?id=26>

Impact & management

Losses incurred by *Ceratitis cosyra* can be substantial, especially on mango. Prior to the establishment of the exotic invasive species *Bactrocera dorsalis*, it was the main pest species on this crop but is now largely replaced by the latter. Seasonal studies in western Africa show that *C. cosyra* is predominant in the dry season, compared to *B. dorsalis* which occurs predominantly in the rainy season (Vayssières et al., 2015) causing a higher risk for early mango varieties. In addition it can cause heavy damage to *Annona* species like custard apple.

Management for this species is, as for most fruit fly pests, most efficient using an IPM (Integrated Pest Management) program, including aspects such as orchard sanitation, bait sprays, mass trapping among others. General reviews on the current IPM components applied in Africa can be found in chapters 13 to 20 of Ekesi et al. (2016).

No SIT (Sterile Insect Technique) application specifically for this species has been developed in Africa.

Attractants & trapping

Both sexes can be attracted by protein bait products such as liquid protein baits, protein capsules (Questlure), three component Biolure (ammonium acetate, trimethylamine and putresceine) and two component Biolure (ammonium acetate and trimethylamine)

Male flies can be attracted by the following lures: terpinyl acetate, Enriched Ginger Oil (EGO) lure

General information on trapping, types of traps, lures and required density of trapping stations can be found in IAEA (2013), Shelley et al. (2014), and Manrakhan (2016). More specific information on efficacy of trapping and lures for *Ceratitis cosyra* is given in Manrakhan et al. (2017), and Mwatawala et al. (2012).

Distribution

Ceratitis cosyra is found throughout Sub-Saharan Africa. Absent in southern parts of South Africa (De Villiers et al., 2013) and Namibia (De Meyer, 2001) largely co-inciding with the distribution limit of the main wild host: marula *Sclerocarya birrea*. In Indian Ocean only reported from Madagascar. Not established outside Africa.

Distribution map based upon specimen records with georeferences in:

<http://projects.bebif.be/fruitfly/taxoninfo.html?id=26>

Others

CABI Plantwise factsheet on *C. cosyra* can be found at:

<http://www.plantwise.org/knowledgebank/datasheet.aspx?dsid=12370>

CABI invasive species compendium on *C. cosyra* can be found at:

<http://www.cabi.org/isc/datasheet/12370>

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