Factsheet *Ceratitis rosa* Karsch

Original name: *Ceratitis rosa* Karsch, 1887: 1.

Vernacular name: Natal fruit fly

Formal redescription (after De Meyer & Freidberg, 2006)

Body length: 4.96 (4.25-5.30) mm; wing length: 5.34 (4.50-5.75) mm.

Male
Head: Antenna yellow. First flagellomere 2-3 times as long as pedicel. Arista with short to moderately long rays; ventral rays shorter and sparser than dorsal rays, especially basally. Frons yellow; with short scattered setulae distinctly darker than frons. Frontal setae well developed. Face yellowish white. Genal seta and setulae dark, well developed.
Thorax: Postpronotal lobe yellowish white, without spot, although sometimes darker yellow around postpronotal seta. Scutal pattern: ground color grayish-brown with orange tinge; with streaks and darker markings but without distinct spots except prescutellar white markings separate, usually with paler area in between. Scapular setae dark. Scutellum yellowish white, basally usually with two separate dark spots, sometimes less distinct; apically with three separate black spots, extending to basal 0.33. Anepisternum on ventral half darker yellowish brown; setulae pale.
Legs: Yellow except where otherwise noted; setation typical for subgenus, mainly pale. Foreleg: femur without bushy feathering posteriorly, only dispersed rows of long black setulae posterodorsally, posteroventrally shorter and pale; ventral setae black. Midleg: femur with few dispersed pale setulae ventrally; tibia moderately broadened; anteriorly black with conspicuous silvery shine when viewed from certain angle on distal 0.66 to 0.75 (black color sometimes inconspicuous in teneral specimens but silvery shine is always present) with black feathering dorsally along distal 0.75 and ventrally along distal 0.66, ocassionaly to distal 0.75. Hindleg: femur at apical 0.25 with longer setulae dorsally and ventrally.
Wing: banding yellowish brown. Interruption between marginal and discal bands near vein R_1 clear and complete; cubital band free; medial band absent; crossvein R-M opposite middle of discal cell. Apex of vein R_1 distal to level of crossvein R-M. Crossvein DM-Cu oblique anterobasally.
Abdomen: Mostly yellow. Tergites 2 and 4 with pale gray band on posterior half, anterior margin sometimes with narrowly brownish colored, especially laterally. Tergite 3 with posterior half patchily brownish colored, anterior half yellowish brown, both parts not clearly demarcated; sometimes more complete brown. Tergite 5 with basal half brownish, sometimes divided medially into two spots. Male epandrium in lateral view with posterior lobe of lateral surstylus short and straight, anterior lobe well pronounced.

Female
As male except for the following characters: First flagellomere yellowish orange. Crossvein DM-Cu oblique posterobasally. Anepisternum on ventral part rarely with darker setulae. Legs without feathering; forefemur posteroventrally with pale pilosity, at least basally. Oviscape shorter than preabdomen. Aculeus at most six times longer than wide; tip with distinct apical indentation and lateral margin slightly sinuous.

Remark: *Ceratitis rosa* belongs to the FAR complex (see De Meyer et al., 2015 for a review). While male specimens can be easily differentiated from *C. fasciventris* and *C. anonae*, female specimens of *Ceratitis fasciventris*, *C. rosa* and *C. quilicii* cannot be differentiated on morphological grounds. The

differences with *C. anonae* are minute and subtle and these can be easily confused. Male specimens of *C. rosa* and *C. quilicii* can be differentiated by the shape and ornamentation of the mid tibia. Until recently, specimens of both *C. quilicii* and *C. rosa* were considered as belonging to *C. rosa*. The former was only in 2015 recognized as a separate species. Large part of the literature on *C. rosa* will thus include information actually referring to *C. quilicii*, *C. rosa* or both.

Encyclopedia of Life link: http://eol.org/pages/725499/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+rosa&searchTax=

The molecular identification of *C. rosa* through DNA barcoding proves to be problematic as this species cannot be properly resolved from the closely related species of the FAR (*C. fasciventris, C. anonae, C. rosa*) complex (De Meyer *et al.* 2015) as well as from the recently described *C. quilicii* (De Meyer *et al.* 2016). Accordingly, in BOLD, these four species are recovered as part of multispecific BINs.

Biology

Prior to 2015, there was no distinction between *Ceratitis rosa* and *Ceratitis quilicii* in the scientific literature. As such biological data published prior to 2015 could have possibly been related to both species. *Ceratitis rosa* can complete its immature development in 17-68 days at 30°C- 15°C (Tanga et al., 2015). Adult females lay eggs 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.

Host plant list

Ceratitis rosa is a polyphagous species. Currently, available host records can refer to *C. quilicii*, *C. rosa* or to both. De Meyer et al. (2016) lists those confirmed records specifically for *C. rosa*. The table below list those hosts known for both *C. quilicii* and *C. rosa*.

PlantFamily	PlantLatinName	PlantCommonNameEnglish
Anacardiaceae	Anacardium occidentale	cashew nut
Anacardiaceae	Harpephyllum caffrum	kaffir plum, wild plum
Anacardiaceae	Mangifera indica	mango
Annonaceae	Annona cherimola	cherimoya
Annonaceae	Annona muricata	soursop
Annonaceae	Annona reticulata	custard apple
Annonaceae	Annona senegalensis	wild custard apple
Annonaceae	Annona squamosa	sugar-apple

Annonaceae	Cananga odorata	ylang-ylang
Annonaceae	Lettowianthus stellatus	
Annonaceae	Monanthotaxis fornicata	
Annonaceae	Monodora grandidieri	
Annonaceae	Sphaerocoryne gracilis	
Annonaceae	Uvaria acuminata	
Annonaceae	Uvaria lucida	cluster-pear
Apocynaceae	Carissa carandas	
Apocynaceae	Carissa grandiflora	natal plum
Apocynaceae	Dictyophleba lucida	
Boraginaceae	Ehretia cymosa	
Cactaceae	Cereus peruvianus	peruvian apple
Cactaceae	Hylocereus undatus	dragon fruit
Cactaceae	Opuntia ficus-indica	prickly pear, indian fig
Caricaceae	Carica cauliflora	mountain pawpaw
Caricaceae	Carica papaya	papaya, pawpaw
Cecropiaceae	Myrianthus arboreus	bugtree?
Celastraceae	Salacia elegans	
Clusiaceae	Calophyllum tacamahaca	
Clusiaceae	Garcinia mangostana	mangosteen
Combretaceae	Terminalia catappa	tropical almond
Cucurbitaceae	Cucurbita sp.	pumpkin, squash
Ebenaceae	Diospyros kabuyeana	
Ebenaceae	Diospyros kaki	japanese persimmon
Euphorbiaceae	Drypetes battiscombei	
Euphorbiaceae	Drypetes natalensis var. leiogyna	
Euphorbiaceae	Drypetes natalensis var. natalensis	
Euphorbiaceae	Phyllanthus acidus	star gooseberry
Fabaceae	Angylocalyx braunii	
Fabaceae	Inga laurina	sackycac, ice cream bean
Fabaceae	Pithecellobium dulce	
Flacourtiaceae	Dovyalis caffra	kei apple
Flacourtiaceae	Dovyalis hebecarpa	ceylon gooseberry
Flacourtiaceae	Flacourtia indica	governor's plum
Flacourtiaceae	Ludia mauritiana	
Flacourtiaceae	Rawsonia lucida	
Lauraceae	Persea americana	avocado
Liliaceae	Gloriosa sp.	
Loganiaceae	Strychnos sp.	
Loganiaceae	Strychnos spinosa	
Moraceae	Ficus carica	common fig
Moraceae	Ficus sp.	fig
Musaceae	Musa nana	banana
Myrtaceae	Acca sellowiana	pineapple guava
Myrtaceae	Eugenia uniflora	surinam cherry, pitanga cherry

Myrtaceae	Psidium cattleyanum	strawberry guava, cherry guava
Myrtaceae	Psidium friedrichsthalianum	coronilla
Myrtaceae	Psidium guajava	common guava
Myrtaceae	Psidium guineense	
Myrtaceae	Psidium japonicum	
Myrtaceae	Psidium sp.	
Myrtaceae	Syzygium aqueum	watery rose-apple
Myrtaceae	Syzygium cumini	Java plum
Myrtaceae	Syzygium jambos	rose-apple
Myrtaceae	Syzygium malaccense	Malay-apple
Myrtaceae	Syzygium samarangense	java apple
Olacaceae	Strombosiopsis sp.	
Opiliaceae	Opilia amentacea	
Oxalidaceae	Averrhoa bilimbi	cucumber tree, pickle fruit
Oxalidaceae	Averrhoa carambola	carambola/starfruit
Polygonaceae	Coccoloba uvifera	seagrape
Rhamnaceae	Ziziphus jujuba	common jujube
Rhamnaceae	Ziziphus mauritiana	indian jujube
Rosaceae	Cydonia vulgaris	quince
Rosaceae	Eriobotrya japonica	loquat
Rosaceae	Malus domestica	apple
Rosaceae	Prunus armeniaca	apricot
Rosaceae	Prunus domestica	plum
Rosaceae	Prunus persica	peach
Rosaceae	Pyrus communis	pear
Rosaceae	Rubus sp.	berry
Rubiaceae	Calycosiphonia spathicalyx	
Rubiaceae	Coffea arabica	arabica coffee
Rubiaceae	Coffea sp.	coffee
Rubiaceae	Tricalysia pallens	
Rutaceae	Citrus aurantium	sour orange
Rutaceae	Citrus reticulata	tangerine
Rutaceae	Citrus sinensis	sweet orange
Rutaceae	Citrus x nobilis	tangor
Rutaceae	Citrus x paradisi	grapefruit
Rutaceae	Murraya paniculata	orange jessamine
Rutaceae	Toddalia asiatica	
Sapindaceae	Allophylus pervillei	
Sapindaceae	Dimocarpus longan	longan
Sapindaceae	Litchi chinensis	litchi, lychee
Sapotaceae	Chrysophyllum cainito	common star-apple
Sapotaceae	Chrysophyllum carpussum	
Sapotaceae	Chrysophyllum magalismontanum	
Sapotaceae	Chrysophyllum natalense	
Sapotaceae	Englerophytum natalense	

Sapotaceae	Manilkara zapota	sapodilla, chicle
Sapotaceae	Mimusops elengi	spanish cherry
Sapotaceae	Mimusops obtusifolia	round-fruited red-milkwood
Sapotaceae	Pouteria usambarensis	
Sapotaceae	Richardella campechiana	ties, egg fruit
Sapotaceae	Synsepalum brevipes	
Sapotaceae	Synsepalum dulcificum	miraculous fruit
Sapotaceae	Synsepalum subvertillatum	
Solanaceae	Capsicum frutescens	tabasco pepper
Solanaceae	Solanum auriculatum	
Solanaceae	Solanum giganteum	red bitter-apple
Solanaceae	Solanum lycopersicum	tomato
Solanaceae	Solanum mauritianum	bugtree
Sterculiaceae	Cola natalensis	
Sterculiaceae	Theobroma cacao	cocoa

Additional information on host records and associated specimens can be found on :
http://projects.bebif.be/fruitfly/taxoninfo.html?id=62

Impact & management

Losses incurred by *Ceratitis rosa* are not well quantified.

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 (Torula yeast), protein bait capsules (Questlure) three component biolure, and two component Biolure (ammonium acetate and trimethylamine).

Male flies can be attracted by trimedlure and Enriched Ginger Oil (EGO) lure (Mwatawala et al., 2015).

General information on trapping, types of traps, lures and required density of trapping stations can be found in IAEA (2013), Shelly et al. (2014), and Manrakhan (2016). Specific trapping information can be found in Mwatawala et al. (2015).

Distribution

Ceratitis rosa is found throughout eastern and southern Africa, from the northern provinces of South Africa (Limpopo, Mpumalange, Kwa-Zulu Natal) northwards till Kenya. It appears to prefer warmer conditions than its close ally, *C. quilicii*. Not established outside mainland Africa (records from the Indian Ocean islands actually refer to *C. quilicii*).

Distribution map for Africa, based upon specimen records with georeferences, is available at:

http://projects.bebif.be/fruitfly/taxoninfo.html?id=62

Quarantine regulations

Ceratitis rosa is listed on the A1 quarantine pest list of EPPO. *Ceratitis rosa* is listed as a quarantine pest in Israel, Jordan and New Zealand (https://gd.eppo.int/taxon/CERTRO/categorization). *Ceratitis rosa* is also a pest of quarantine concern in Japan.

Others

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

http://www.plantwise.org/knowledgebank/datasheet.aspx?dsid=12378

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

http://www.cabi.org/isc/datasheet/12378

Remark: the above sheets do not differentiate between *C. rosa* and *C. quilicii*.

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