EPPO Datasheet: *Aphis citricidus*

Last updated: 2021-06-10

IDENTITY

Preferred name: *Aphis citricidus*
Authority: (Kirkaldy)
Taxonomic position: Animalia: Arthropoda: Hexapoda: Insecta: Hemiptera: Sternorrhyncha: Aphididae
Other scientific names: *Aphis aeglis* Shinji, *Aphis nigricans* van der Goot, *Aphis tavaresi* Del Guercio, *Myzus citricidus* Kirkaldy, *Paratoxoptera argentiniensis* Blanchard, *Toxoptera aphoides* van der Goot, *Toxoptera citricida* (Kirkaldy), *Toxoptera citricidus* (Kirkaldy), *Toxoptera tavaresi* (Del Guercio)
Common names: brown citrus aphid, oriental black citrus aphid, tropical citrus aphid
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EPPO Categorization: A2 list
view more categorizations online...
EU Categorization: A2 Quarantine pest (Annex II B)
EPPO Code: TOXOCI

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Notes on taxonomy and nomenclature

Aphis citricidus was described as *Myzus citricidus* because of its resemblance to *Myzus cerasi* according to its author (Kirkaldy, 1907). A few years later it was transferred to the genus *Aphis* and later to the genus *Toxoptera*. It has now been returned to the genus *Aphis*, because *Toxoptera* was synonymized with *Aphis* by Lagos *et al.* (2014), as a result of the study of 41 morphological characteristics and the sequences of COI and EF1-*?* of 68 species of the subtribe Aphidina. Nieto Nafría *et al.* (2011) established that *citricidus* is the correct specific epithet for the species, instead of *citricida*, which was frequently used. For much of the 20th century, *A. citricidus* has often been confused with *A. aurantii* Boyer de Fonscolombe, the black citrus aphid, several records of the latter applying to *A. citricidus*.

HOSTS

Aphis citricidus preferentially feeds on *Citrus* species (Rutaceae) and also on other Rutaceae; Blackman & Eastop (2021) specifically list *C. aurantiifolia*, *C. aurantium*, *C. glauca*, *C. limon*, *C. maxima*, *C. media*, *C. reticulata* and *C. sinensis.*

A. citricidus is catalogued as a polyphagous aphid, with a preference for the Rutaceae, although it may be limited to colonizing young growth of plants of other families, on which it can establish dense colonies. Blackman & Eastop (2021). In Northern Spain, Hermoso de Mendoza *et al.* (2008) occasionally found high populations levels of the aphid on *Chaenomeles speciosa* (Rosaceae) which is cultivated as an ornamental. Michaud (1998) listed 28 plant families (including Rutaceae) on which *A. citricidus* has been observed.

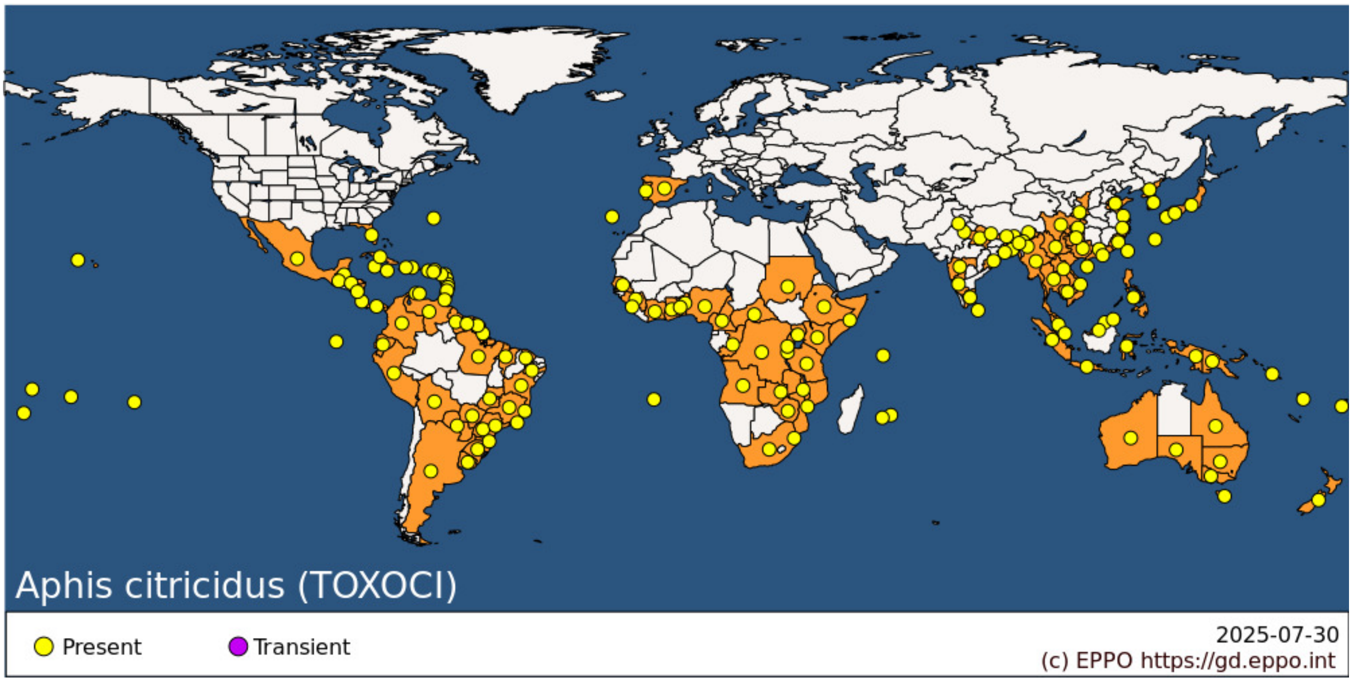
Host list: *Artabotrys hexapetalus*, *Artocarpus altilis*, *Atalantia buxifolia*, *Berberis sp.*, *Boehmeria sp.*, *Bombax ceiba*, *Bougainvillea spectabilis*, *Bridelia ovata*, *Calodendrum capense*, *Camellia japonica*, *Cassia sp.*, *Chaenomeles lagenaria*, *Chamaecrista absus*, *Choisya ternata*, *Cinnamomum camphora*, *Citrus glauca*, *Citrus karna*, *Citrus maxima*, *Citrus medica*, *Citrus reticulata*, *Citrus trifoliata*, *Citrus x aurantiifolia*, *Citrus x aurantium var. paradisi*, *Citrus x aurantium var. sinensis*, *Citrus x aurantium*, *Citrus x junos*, *Citrus x limon*, *Citrus x limonia var. jambhiri*, *Clausena lansium*, *Cleistanthus monoicus*, *Clutia abyssinica*, *Coffea arabica*, *Commiphora mollis*, *Cotoneaster sp.*, *Crataegus sp.*, *Dianthus sp.*, *Dioscorea rotundata*, *Diospyros kaki*, *Engelhardia spicata*, *Eriobotrya sp.*, *Eurya japonica*, *Ficus carica*, *Ficus ingens*, *Ficus retusa*, *Flindersia xanthoxyla*, *Fortunella margarita*, *Geijera parviflora*, *Gonostegia hirta*, *Gossypium hirsutum*, *Ipomoea staphylina*, *Lasianthus chinensis*, *Limonia acidissima*, *Litsea monopetala*, *Loranthus sp.*, *Maclura cochinchinensis*, *Maclura tricuspidata*, *Maesa chisia*, *Magnolia sp.*, *Malpighia glabra*, *Malus domestica*, *Malus sylvestris*, *Mangifera indica*, *Murraya paniculata*, *Nicotiana tabacum*, *Oxalis pes-caprae*

, *Passiflora foetida*, *Pyrus communis*, *Quercus griffithii*, *Rhododendron sp.*, *Rhus sp.*, *Rorippa indica*, *Rubia cordifolia*, *Samanea saman*, *Schima wallichii*, *Solanum aligerum*, *Terminalia catappa*, *Tetradium daniellii*, *Toxicodendron khasianum*, *Trema orientale*, *Triphasia trifolia*, *Ulmus procera*, *Vepris lanceolata*, *Viburnum foetidum*, *Xylosma congesta*, *Zanthoxylum armatum*, *Zanthoxylum asiaticum*, *Zanthoxylum fagara*, *x Citrofortunella floridana*, *x Citrofortunella microcarpa*

GEOGRAPHICAL DISTRIBUTION

A. citricidus is thought to originate from South-East Asia (Michaud, 1998) and occurs predominantly in humid tropical regions. Hermoso de Mendoza *et al.* (2008) presented the history of the dispersal of the species from Asia to many other parts of the world with citrus plants. It is widespread in Africa south of the Sahara, and also present in Australia, New Zealand, and the Pacific Islands. It has also spread to citrus-growing areas in Central America, the Caribbean and Southern USA (Halbert, 1996). In the early 2000s, it was first found in Mediterranean Basin, in Northern Portugal and Northern Spain.

A. citricidus thrives in moist warm climates and seems able to tolerate colder conditions than *A. aurantii*, for example occurring at higher altitudes, but it is not found in regions with long hot dry seasons (Blackman & Eastop, 2021). It is known to occur in territories with a Mediterranean climate (in Europe, North America, South America, Africa and Australia) and even in territories with a Euro-Atlantic climate with mild winters, such as Northern Portugal, Galicia and the northern slopes of the Cantabrian Mountains in Spain (Ilharco *et al.*, 2005; Hermoso de Mendoza *et al.*, 2008).



EPPO Region: Portugal (mainland, Madeira), Spain (mainland)
Africa: Angola, Benin, Burundi, Cameroon, Central African Republic, Congo, Congo, The Democratic Republic of the, Cote d'Ivoire, Eswatini, Ethiopia, Ghana, Guinea, Kenya, Malawi, Mauritius, Mozambique, Nigeria, Reunion, Rwanda, Saint Helena, Senegal, Seychelles, Sierra Leone, Somalia, South Africa, Sudan, Tanzania, United Republic of, Togo, Uganda, Zambia, Zimbabwe
Asia: Bangladesh, Bhutan, Brunei Darussalam, Cambodia, China (Chongqing, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Jiangsu, Shaanxi, Shandong, Sichuan, Xianggang (Hong Kong), Yunnan, Zhejiang), India (Arunachal Pradesh, Assam, Delhi, Karnataka, Maharashtra, Manipur, Meghalaya, Odisha, Punjab, Sikkim, Tamil Nadu, Uttar Pradesh, West Bengal), Indonesia (Irian Jaya, Java, Sulawesi, Sumatra), Japan (Honshu, Kyushu, Ryukyu Archipelago, Shikoku), Korea, Democratic People's Republic of, Korea, Republic of, Lao People's Democratic Republic, Malaysia (Sabah, Sarawak, West), Myanmar, Nepal, Philippines, Singapore, Sri Lanka, Taiwan, Thailand, Vietnam
North America: Mexico, United States of America (Florida, Hawaii)
Central America and Caribbean: Antigua and Barbuda, Aruba, Belize, Bermuda, Cayman Islands, Costa Rica,

Cuba, Dominica, Dominican Republic, Grenada, Guadeloupe, Guatemala, Haiti, Honduras, Jamaica, Martinique, Netherlands Antilles, Nicaragua, Panama, Puerto Rico, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Trinidad and Tobago, Virgin Islands (British), Virgin Islands (US)
South America: Argentina, Bolivia, Brazil (Amapa, Bahia, Ceara, Espirito Santo, Goias, Maranhao, Mato Grosso do Sul, Minas Gerais, Para, Parana, Pernambuco, Rio de Janeiro, Rio Grande do Sul, Santa Catarina, Sao Paulo), Colombia, Ecuador (Galapagos), French Guiana, Guyana, Paraguay, Peru, Suriname, Uruguay, Venezuela
Oceania: Australia (New South Wales, Queensland, South Australia, Tasmania, Victoria, Western Australia), Cook Islands, Fiji, French Polynesia, New Zealand, Papua New Guinea, Samoa, Solomon Islands, Tonga, Vanuatu

BIOLOGY

Aphis citricidus is an anholocyclic aphid (i.e. its annual life cycle is completed without sexual generation) everywhere except in Japan (Komazaki, 1988). Generations of parthenogenetic and viviparous females follow one another continuously and, as in almost all aphids, the birth of the first daughter of a female occurs shortly after the end of the imaginal molt, and successive births occur very rapidly.

Galatoire (1983), Takahashi (1989), Michaud, (1998) and Shang *et al.* (2016) among others, report details on life cycle, population dynamics and flight dispersal. In Northern Spain, Hermoso de Mendoza *et al.* (2008) report that the populations of the species were maintained parthenogenetically with production of alate viviparous females throughout the study period (June 2002 to October 2007). They concluded from the trapped alata that each year there was a long minimum period of flight in winter and another short minimum period in midsummer, and one or two maxima in the passage from spring to summer and another maximum in autumn.

A citricidus is considered to be the most efficient vector of citrus tristeza virus (CTV), a phloem-limited closterovirus. In particular, it can transmit the most aggressive strains of CTV causing quick decline and stem-pitting (Hermoso de Mendoza *et al.* (2008). CTV is transmitted by *A. citricidus* is a semi-persistent mode.

DETECTION AND IDENTIFICATION

Symptoms

Growth of citrus shoots is greatly impaired, and they become distorted; leaves become brittle and wrinkled and curl downwards. Attacked flowers fail to open or do so abortively since the ovaries are deformed.

Morphology

Apterae are 1.5–2.4 mm long, very dark shiny brown to shiny black and with antennas partially dark (proximal and distal segments) and light (intermediate segments). According to Blackman & Eastop (2021), the best characters to differentiate the apterous viviparous females of *A. citricidus* from those of *A. aurantii* are: longest seta on antennal segment III 29–64 µm in *A. citricidus* versus 12–27 in *A. aurantii*; longest seta on hind tibia 80 µm at least in *A. citricidus* versus 60 µm at most in *A. aurantii*.

Alatae have a shiny black abdomen, with a wholly black third antennal segment succeeded by a pale fourth segment (which carry respectively 6 to 20 and sometimes 1 to 4 secondary sensoria), front wing pterostigma is brown but paler than the distal part of femora and median vein of front wing is twice-branched. In *A. aurantii* the pterostigma is as dark brown to black as the femora, and the median vein is one-branched.

Both morphs have long (about 1/6 body length), truncated-conical and strongly sculptured siphunculi, and thick and bluntly rounded at the apex cauda, with very long setae.

A useful character to distinguish *A. citricidus* from *A. aurantii* is that disturbed colonies of the latter produce a distinct scraping sound, audible from up to 45 cm from the leaf, whereas those of *A. citricidus* do not. In addition, specimens of *A. citricidus* in a small volume of alcohol turns the liquid deep red gradually, whereas specimens of other species of subgenus *Toxoptera* do not.

Detection and inspection methods

In countries where *A. citricidus* occurs or may occur, citrus groves should be meticulously inspected when leaf and flower buds emerge and grow.

The use of yellow water traps (a yellow basin filled at 2/3 of its capacity with water and a few drops of a surfactant product) are very useful to detect alate viviparous females at the beginning of the vegetative development season of the crops. Many aphids can fall in them, but the identification of alata of *A. citricidus* is not particularly complicated.

Plants that are transported must be carefully checked whatever their stage of development. Foliage should also be examined for dead, parasitized aphids or mummies, which adhere to the leaves and can be used for identification in the absence of living specimens.

If the aphid cannot be positively identified on the spot using a pocket lens, specimens should be preserved in ethanol. It is adequate to use 70% ethanol to transport the specimens to the laboratory and observe them with the stereomicroscope, to make microscopic preparations, to store them or send them to a specialist. For mitochondrial COII analysis, specimens must be preserved in 96-99% ethanol.

Guidance on the morphological identification of *A. citricidus* can be found in the EPPO diagnostic protocol (EPPO, 2006).

PATHWAYS FOR MOVEMENT

A. citricidus can spread locally by flight. Over long distances, the main pathway for introducing *A. citricidus* into new areas is the movement of plants for planting (EFSA, 2018). It has been intercepted, but very infrequently, in mainland USA on citrus from Hawaii and the Philippines. It is more strongly attracted to yellow than many other aphids and it may therefore be transported on yellow packaging or aircraft parts.

PEST SIGNIFICANCE

Economic impact

Aphis citricidus per se causes considerable damage to citrus trees by attacking shoots and flowers and sometimes young fruit. Even a few aphids on a young shoot will arrest blossom bud development and cause them to fall. Losses of up to 50% can result from feeding damage (Kranz *et al.*, 1977). After petal fall, however, growing plant parts harden and this results in less damage, even at relatively high population levels. As is the case for other *Aphis* species, sooty mold forms on the aphid honeydew, interfering with leaf photosynthesis and forming unsightly deposits on fruits, which reduces their market value.

Citrus tristeza virus (CTV) is transmitted by several species of aphids (e.g. *Aphis gossypii, A. spiraecola, A. aurantii, A. craccivora* and *Myzus persicae*) through a semi-persistent transmission mode, but certainly *A. citricidus* is the most efficient CTV vector. Therefore, most of the losses produced by this virus infection in the countries where *A. citricidus* is found are indirectly attributable to it. This aphid also transmits citrus vein-enation disease in South Africa.

Control

Control measures are intended to prevent damage to young shoots and fruits, and especially to suppress the formation of alatae, which are liable to transmit viruses (Kranz *et al.*, 1977). Applications of authorized insecticides on affected plants are recommended for treatment of recognized foci. Young trees can be treated preventively with systemic insecticides. Many natural enemies are known, some parasitoids (e.g. *Lysiphlebus testaceipes* and *Lipolexis oregmae*, both Hymenoptera: Braconidae) are being used in integrated control programs (Zamora Mejias, 2011). In Northern Spain, Hermoso de Mendoza *et al.* (2008) cited a plethora of natural enemies that acted on populations of *A. citricidus*

: 5 species of Aphidiinae (Hymenoptera: Braconidae), 1 of Cecidomyiidae, 1 of Chamaemyiidae and 6 of Syrphidae (Diptera), 2 of Chrysopidae (Neuroptera), 5 of Coccinellidae (Coleoptera), 1 of Anthocoridae (Hemiptera) and 1 of Trombidiidae (Acari: Trombidiformes).

Phytosanitary risk

Since *A. citricidus* has become established in several areas of the world with a Mediterranean climate, it probably has the potential to survive in most Mediterranean countries. The polyphagy of the species increases the risk that an aphid species can invade a territory, establish and spread there. The main risk for Mediterranean countries is the fact that it is a more efficient vector of citrus tristeza virus than the native aphid species or other introduced species, such as *Aphis gossypii*. *A. citricidus* is already present in the Iberian Peninsula, but far from the extensive citrus cultivation areas. Its introduction into new areas would cause serious problems to citrus production, as well as for citrus certification schemes, by creating a much higher risk of reinfection of certified material by tristeza.

PHYTOSANITARY MEASURES

Importation of *Citrus* plants for planting is prohibited or restricted in many EPPO countries to prevent introduction of important pests. If not prohibited, it can be recommended that plants for planting of citrus and other potential hosts should come from a pest-free area or a pest-free place of production. For citrus fruit, it is generally required that they should be free from peduncles and leaves and this should cover the risk of transporting the pest into new areas, as *A. citricidus* does not feed on mature fruit.

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ACKNOWLEDGEMENTS

This datasheet was extensively revised in 2021 by J. M. Nieto Nafría (honorary emeritus professor of Zoology. *Universidad de León*, Leon (Spain). His valuable contribution is gratefully acknowledged.

How to cite this datasheet?

EPPO (2025) *Aphis citricidus*. EPPO datasheets on pests recommended for regulation. Available online. https://gd.eppo.int

Datasheet history

This datasheet was first published in the EPPO Bulletin in 1980 and revised in the two editions of 'Quarantine Pests for Europe' in 1992 and 1997, as well as in 2021. It is now maintained in an electronic format in the EPPO Global Database. The sections on 'Identity', ‘Hosts’, and 'Geographical distribution' are automatically updated from the database. For other sections, the date of last revision is indicated on the right.

CABI/EPPO (1992/1997) *Quarantine Pests for Europe (1st and 2nd edition).* CABI, Wallingford (GB).

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Co-funded by the
European Union