EPPO Datasheet: *Scirtothrips aurantii*

Last updated: 2021-03-15

IDENTITY

Preferred name: *Scirtothrips aurantii*
Authority: Faure
Taxonomic position: Animalia: Arthropoda: Hexapoda: Insecta: Thysanoptera: Thripidae
Other scientific names: *Scirtothrips acaciae* Moulton
Common names: South African citrus thrips
view more common names online...
EPPO Categorization: A1 list
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EU Categorization: Quarantine pest ((EU) 2019/2072 Annex II A)
EPPO Code: SCITAU

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Notes on taxonomy and nomenclature

Described from South Africa (*S. aurantii*) and Ghana (*S. acaciae*). *S. acaciae* has been synonymised by Mound & Palmer (1981: 473).

Intraspecific diversity: In 2002 *S. aurantii* was recorded on *Kalanchoe* (= *Bryophyllum*) *delagoense* in Queensland, Australia. While *S. aurantii* is known from Africa as a highly polyphagous pest, no spread or damage to commercial plantations has been reported from Australia (Rafter *et al*., 2008; Garms *et al.*, 2013; Rafter & Walter, 2013). This led to questions whether this thrips species was actually a cryptic species complex. However, results of both molecular analyses (Morris and Mound, 2004; Hoddle *et al*., 2008) and host adaptation tests (Garms *et al*., 2013) can be interpreted as evidence that the polyphagous South African population of *S. aurantii* and the monophagous invasive population in Australia are the same species.

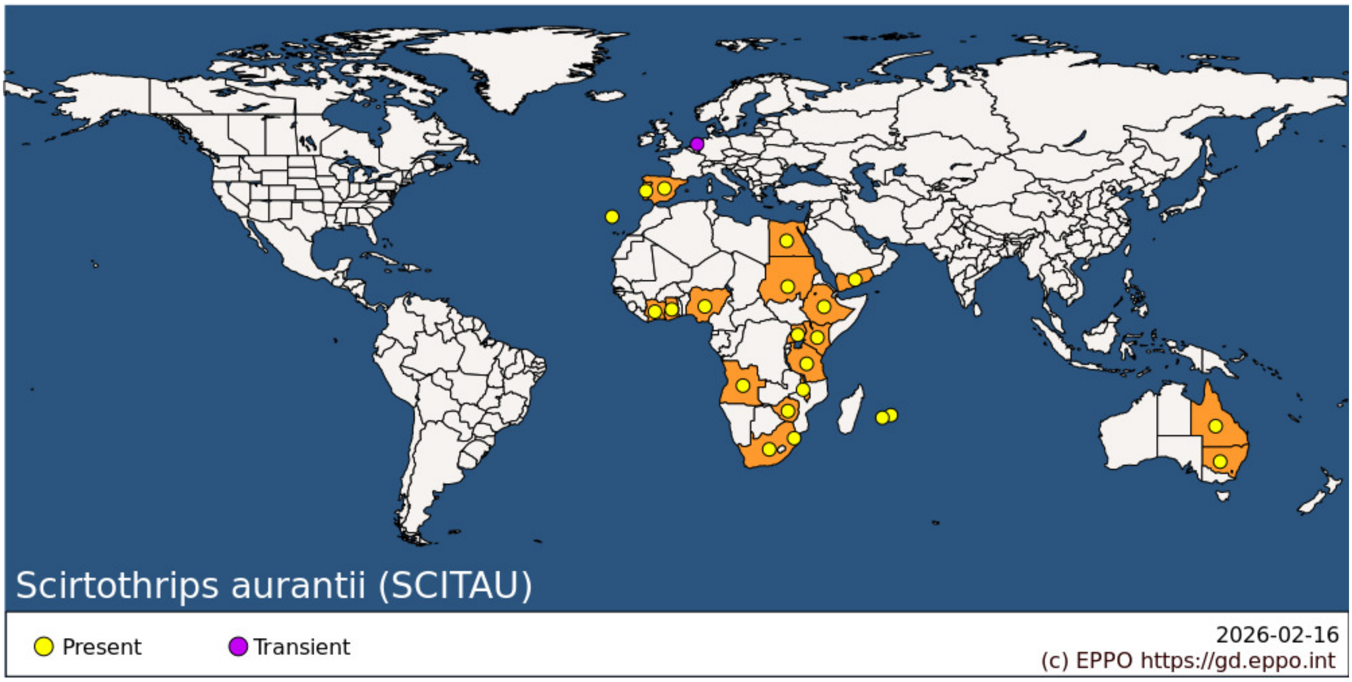
HOSTS

Although usually considered to be associated with *Citrus*, especially oranges (*C. sinensis*) in southern Africa, *S. aurantii* is highly polyphagous and has been found on more than 70 plant species in a wide range of different plant families. Its native hosts are probably *Acacia* and *Combretum* trees, but it has also been found on a range of crops that are not only botanically unrelated but differ widely in form, including amaranth, asparagus, banana, cashew, castor bean, cotton, mango, peanut, and grapevine (Freebairn, 2008). However, the occurrence of adults feeding on a plant does not necessarily constitute this plant as a true host (EFSA, 2018). Reports based on records of adults alone do not provide conclusive evidence of the suitability of a plant, to allow reproduction and sustain development of all life stages of *S. aurantii*. The following host list provides plant species where both larvae and adults of *S. aurantii* have been found, suggesting that they are true hosts.

Host list: *Acacia*, *Acaciella glauca*, *Arachis hypogaea*, *Asparagus*, *Bauhinia galpinii*, *Caesalpinia pulcherrima*, *Calliandra calothyrsus*, *Citroncirus*, *Citrus reticulata*, *Citrus trifoliata*, *Citrus x aurantiifolia*, *Citrus x aurantium var. paradisi*, *Citrus x aurantium var. sinensis*, *Citrus x latifolia*, *Citrus x limon*, *Citrus x nobilis*, *Citrus*, *Combretum*, *Dichrostachys cinerea*, *Diospyros kaki*, *Ficus carica*, *Fortunella*, *Fragaria x ananassa*, *Gloriosa superba*, *Gossypium*, *Grevillea robusta*, *Kalanchoe blossfeldiana*, *Kalanchoe delagoensis*, *Kalanchoe pinnata*, *Macadamia integrifolia*, *Malus domestica*, *Mangifera indica*, *Mucuna coriacea subsp. irritans*, *Musa x paradisiaca*, *Myoporum sp.*, *Myrtus communis*, *Olea europaea*, *Persea americana*, *Pithecellobium dulce*, *Prunus persica*, *Punica granatum*, *Ricinus communis*, *Rosa sp.*, *Rubus idaeus*, *Rubus*, *Salvia rosmarinus*, *Senegalia polyacantha subsp. campylacantha*, *Vaccinium*, *Vachellia karroo*, *Vitis vinifera*, *x Citrofortunella microcarpa*

GEOGRAPHICAL DISTRIBUTION

S. aurantii is native to Africa, and the only records considered to be valid (i.e., supported by voucher specimens in an available collection) from outside this continent are from Australia and Yemen. In the EPPO region, it was first recorded in 2020 in Spain and then in Portugal, and in both countries it is under eradication.



EPPO Region: Netherlands, Portugal (mainland, Madeira), Spain (mainland)
Africa: Angola, Cote d'Ivoire, Egypt, Eswatini, Ethiopia, Ghana, Kenya, Malawi, Mauritius, Nigeria, Reunion, South Africa, Sudan, Tanzania, United Republic of, Uganda, Zimbabwe
Asia: Yemen
Oceania: Australia (New South Wales, Queensland)

BIOLOGY

Scirtothrips females insert their eggs into young and soft tissues of leaves, stems and fruit using their distinctive saw-like ovipositor. After having hatched these thrips go through four developmental stages (Gilbert and Bedford, 1998; Grové *et al*., 2000a; EPPO, 2005; CABI, 2017): two actively feeding immature instars (first and second instar larva), two non-feeding immature instars (prepupa and pupa) and the feeding adults. Both, adults and larvae feed on epidermal and occasionally even palisade cells of young leaves or on young fruit often still concealed under the calyx (Milne and Manicom, 1978); they do not feed on mature leaves. Upon completion of the second instar, larvae seek refuge, usually on the ground in leaf litter, where they pupate. Very occasionally pupae can be found beneath the calyx of fruits, however, as only the youngest fruits are attacked *S. aurantii* rarely occur on harvested fruits. Breeding is almost continuous, with no diapause, although development is slower in colder seasons due to cooler weather and diminishing food supply. The life cycle of *S. aurantii* can be completed within 18 days in summer to 44 days in winter, respectively (Gilbert and Bedford, 1998). In South Africa, more than nine generations per year are known to occur in citrus and mangoes. Adults are probably dispersed downwind, but observations in South Africa have suggested that early-season infestations in citrus orchards develop mainly from thrips that have overwintered within each orchard, rather than from adults flying in from wild plants (Gilbert, 1990; Gilbert and Samways, 2018). Later in the season (November and December), wild hosts probably assume greater importance as a source of the pest. Citrus trees close to windbreaks made of host plants (e.g. *Grevillea* trees which harbour *S. aurantii*) had more severe fruit scarring than citrus trees close to non-host windbreaks (e.g. *Pinus* or *Casuarina* trees) (Grout and Richards, 1990a; Dubois and Quilici, 1999).

DETECTION AND IDENTIFICATION

Symptoms

Sucking injury on leaves first becomes apparent in silvering of the leaf surface (caused by dry, air-filled cells) and linear thickenings of the leaf lamina. Furthermore, leaves with these symptoms are usually covered with small dark fecal droplets. On fruit, feeding marks usually form a ring of scarred tissues around the base that enlarges with growth. Injuries to both, leaves and fruits finally lead to brownish frass markings, which may result in early leaf senescence and fruit distortion. A severe attack to flushes of young leaves late in the season may reduce the crop of the following season (Kamburov, 1991). Fruit of Navel orange cultivars are considered the most susceptible to this thrips (Gilbert and Bedford, 1998).

Morphology

Members of the genus *Scirtothrips* are readily distinguished from all other Thripidae by the following characteristics: antennae 8-segmented, sense cones forked; head transversely striate with 3 pairs of ocellar setae; pronotum transversely striate with 4 pairs of posteromarginal setae; mesonotum with median pair of setae arising well in front of the posterior margin; metanotum with median pair of setae at or near to anterior margin of the plate; abdominal tergites with regular microtrichial fields on lateral thirds, tergite VIII with well-developed posteromarginal comb; sternites with marginal setae arising at posterior margin; males with sternal glandular areas not developed.

At present, 106 extant *Scirtothrips* species are known (ThripsWiki, 2020), however, the validity of some is in doubt (Mound and zur Strassen, 2001; Hoddle *et al*., 2008; Mound & Hoddle, 2016). In summary, *S. aurantii* may be characterised by the following structures.

Eggs

The eggs are reniform, pale and opaque (length < 0.2 mm).

Larva

The small white first larval instars resemble adults but lack wing pads and have a lesser number of antennal segments. The second larval instar is similar to the previous stage but larger. The identification of larvae based on morphological features is difficult (see Ulitzka, 2020).

Pupa

No precise description of the prepupae and pupae are given in the literature. Both resemble larvae regarding their body shape; however, they possess wing pads.

Adults

- Females are yellow with brown markings medially on the tergites; their body length is about 1.1mm. The main morphological characteristics are as follows: antennae 8-segmented; pronotum closely striate, without long setae on the posterior angles; forewing: second vein with 2–5 setae; posteromarginal fringe cilia wavy, not straight; abdominal tergites laterally with numerous rows of tiny microtrichia.

- Males are similar to females in colour and shape, but smaller (about 0.8mm); easily recognized by a comb of 5–7 stout dark setae on distal posterior margin of the hind femora and a pair of long curved dark processes laterally on abdominal tergite IX.

The EPPO Diagnostic Protocol for *S. aurantii, S. citri* and *S. dorsalis* provides recommendations on how to detect and identify the pest (EPPO Standard PM 7/56, 2005).

Detection and inspection methods

All motile stages of *S. aurantii* feed on young leaves and on the base of young fruit, particularly when concealed under the calyx. They could be carried on seedlings or cuttings with young leaf buds. Detecting adults of *S. aurantii* is not easy, particularly, when they are present only in low numbers on the plants. Quiescent stages such as pupae may hide in leaf axils, under the calyces of flowers and fruit, or in the soil. They can easily be overlooked, as can eggs which are hidden in the leaf tissue (MacLeod and Collins, 2006). Mature fruit, on the contrary, are not considered to be a potential pathway. However, damage from an earlier infestation may be seen on mature citrus fruit in the form of annular scars (rings around the fruit base) and deformations (MacLeod and Collins, 2006; EFSA PLH Panel, 2018). These symptoms could be used as an indicator to trigger further surveillance of the pest (EFSA, 2019). Therefore, trapping *S. aurantii* in high-risk locations where mature fruit show symptoms can be considered as a relevant component of the pest survey activity. Placing traps in the fields after tracing back to the production site where the symptomatic fruit come from could also be a target of survey efforts to increase the probability of finding the pests (EFSA, 2019).

Detailed protocols for surveillance, sampling and detection are indicated in the EFSA pest survey card (EFSA, 2019).

PATHWAYS FOR MOVEMENT

As mentioned above under Biology, the potential of *Scirtothrips aurantii* for natural spread is relatively limited. In international trade, *S. aurantii* could be carried on plants for planting (on young leaves or in the growing medium attached) as well as on cut flowers or cut foliage, but in fact interceptions are relatively rare (EFSA, 2018; Vierbergen *et al*., 2010). Nevertheless, it has been introduced to Australia and more recently to Spain.

Unlike other Thysanoptera, *Scirtothrips* sp. seem to require access to soft green tissues, except when pupating in leaf litter and soil. So only seedlings or cuttings with young growing leaf buds are liable to carry these pests. EFSA (2018) considers that *S. aurantii* is unlikely to be associated with mature fruit as they do not feed or oviposit on mature fruit.

PEST SIGNIFICANCE

Economic impact

At least ten species of *Scirtothrips* are known as pests of various crops in different parts of the tropics, but most of them have restricted geographic ranges and breed on specific tropical host plants, such as *S. kenyensis* which damages tea and coffee in Eastern Africa (Moritz *et al.*, 2013), or *S. manihoti* which causes serious leaf distortion of cassava in Central and South America (Mound and zur Strassen, 2001). *Scirtothrips* species are particularly associated with plants that grow in warm, dry conditions; they are usually more abundant on terminal shoots rather than within the canopy of a tree. Along with *S. citri* and *S. dorsalis, S. aurantii* is, as a pest of citrus, one of the most important *Scirtothrips* sp. for international agriculture.

In South Africa and Zimbabwe, *S. aurantii* causes reduction in citrus yields due to serious damage to young leaves and reduces the proportion of export quality fruits. It is a most serious pest at low altitudes (Hill, 1983). It is not generally regarded as harmful to citrus crops further north in Africa, although this might be due to less intensive cultivation practices. Damage to tea plants has been reported from plantations in Malawi (Rattan, 1992), and *S. aurantii* is the primary cause of banana fruit spotting in Yemen (Nasseh and Mughni, 1990). *S. aurantii* is also considered as a pest in mango (Grové *et al.*, 2000a) and avocado (Bara and Laing, 2019).

In Australia, *S. aurantii* is not considered as a crop pest (Garms *et al.*, 2013; Rafter *et al.*, 2013) as it is mainly recorded on the weed *Bryophyllum delagoense*.

Control

Chemical control

Chemical control is often needed to maintain the pest below economical threshold in both citrus and mango production (Samways *et al.*, 1987; Grové *et al.*, 2010b). For citrus, it is recommended to spray fruits towards the end of a main flowering period, when three-quarters of petals have fallen (Hill, 1983). Monitoring of *S. aurantii* using traps is important for optimal timing of insecticide sprays (Grout and Richards, 1990b; Gilbert and Samways, 2018). Bait sprays and insecticides treatments via drip irrigation were used to limit side effect on natural enemies (Grout, 2015; Grout and Stephens, 2005). Grout (2015) notes that the recent increased use of mancozeb against Citrus black spot (*Phyllosticta citricarpa)* in South Africa had negative impacts on natural enemies of *S. aurantii* and that long-residual thripicides are now frequently required for the control of citrus thrips.

Rattan (1992) reported the use of several active substances to control the pest on tea in Malawi. Resistance to synthetic pyrethroids and emetic baits has been reported (Rattan, 1992; Grout *et al.*, 1996).

Biological control

Several species of predacious mites such as *Euseius addoensis* have been shown to contribute to control (Grout and Richards, 1992; Grout, 2015). The hymenopteran parasitoid *Goethana incerta* was shown to parasitize *S. aurantii* in Swaziland and Malawi (Grout and Stephen, 1995a). Moreover, studies have shown that surrounding windbreak trees could favour the maintenance of natural enemies (Grout and Richards, 1990; Grout and Stephen, 1995b). Grout (1996) mentions that *Typhlodromalus* spp. may be effective thrips predators, and that combinations of several natural enemies may provide better control. However, he also hypothesized that *Amblydromella* spp. might compete with the other predatory mites. Research is also being conducted on entomopathogenic fungi (Achampong *et al*., 2020).

Phytosanitary risk

S. aurantii is a very polyphagous species. It could be introduced with plants for planting, cut flowers or cut foliage. Its occurrence in citrus-growing areas with a subtropical or Mediterranean climate suggests that *S. aurantii* could probably establish on citrus in Southern Europe and the Mediterranean area. It is a damaging pest on citrus and requires specific control that may challenge current IPM practices. Mango and avocado are also cultivated in the EPPO region and may be at risk if *S. aurantii* was introduced.

PHYTOSANITARY MEASURES

Importation of *Citrus* plants for planting is prohibited or restricted in many EPPO countries to prevent introduction of important pests. However, *S. aurantii* could be introduced with other plant species, as it is very polyphagous, and adults may be found on plants on which they may not complete their full life cycle. To prevent introduction of the pest, plants for planting should either be dormant (i.e., without leaves and fruit) with no growing medium attached or come from a pest-free area or a pest-free place of production. An insecticide treatment before shipping may also be an option.

Measures for cut flowers/foliage may not be justified as the risk of transfer to host plants at destination is limited.

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ACKNOWLEDGEMENTS

This datasheet was extensively revised in 2021 by Manfred R. Ulitzka, **Thrips-*iD*.** His valuable contribution is gratefully acknowledged.

How to cite this datasheet?

EPPO (2026) *Scirtothrips aurantii*. EPPO datasheets on pests recommended for regulation. Available online. https://gd.eppo.int

Datasheet history

This datasheet was first published in 1997 in the second edition of 'Quarantine Pests for Europe', and revised 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 (1997) *Quarantine Pests for Europe (2nd edition).* CABI, Wallingford (GB).

Co-funded by the European Union