EPPO Datasheet: *Thrips palmi*

Last updated: 2022-09-29

IDENTITY

Preferred name: *Thrips palmi*
Authority: Karny
Taxonomic position: Animalia: Arthropoda: Hexapoda: Insecta: Thysanoptera: Thripidae
Other scientific names: *Chloethrips aureus* Ananthakrishnan & Jagadish, *Thrips clarus* Moulton, *Thrips gossypicola* (Priesner), *Thrips gracilis* Ananthakrishnan & Jadadish, *Thrips leucadophilus* Priesner, *Thrips nilgiriensis* Ramakrishna
Common names: melon thrips, oriental thrips, palm thrips, southern yellow thrips
view more common names online...
EPPO Categorization: A1 list
view more categorizations online...
EU Categorization: Quarantine pest ((EU) 2019/2072 Annex II A)
EPPO Code: THRIPL

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HOSTS

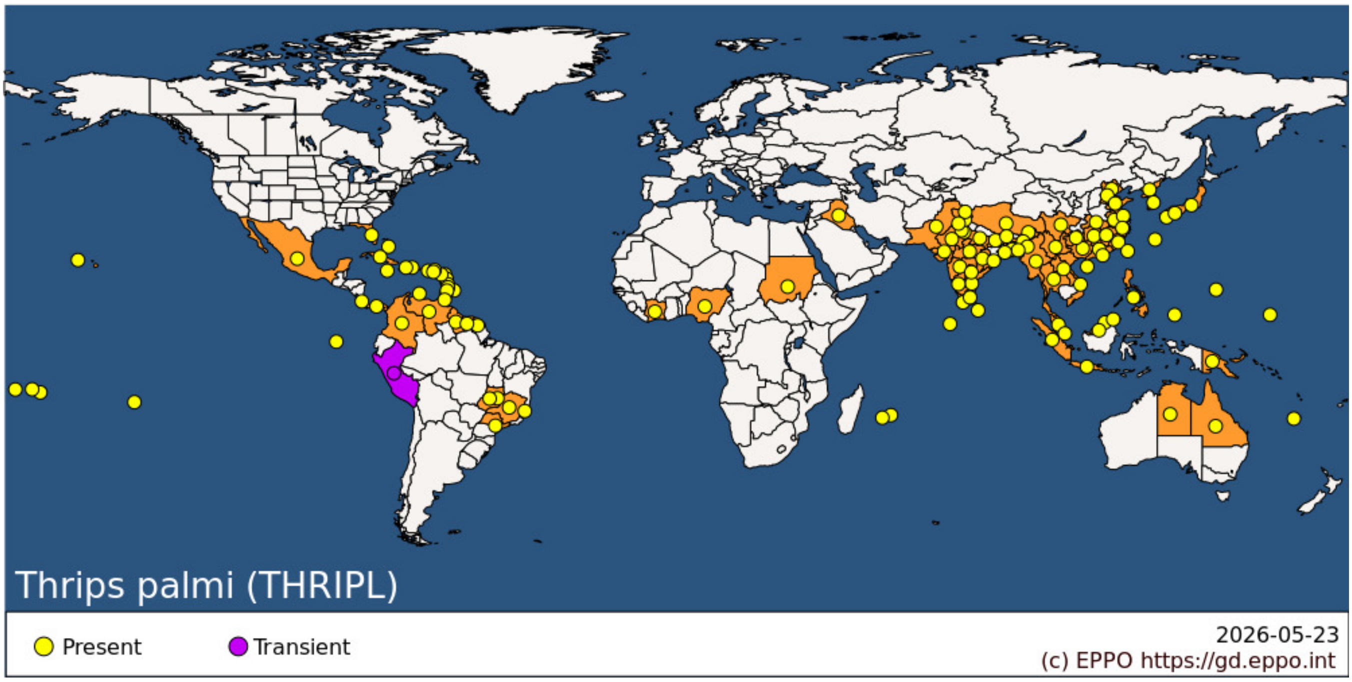
Thrips palmi is a polyphagous pest, especially of Cucurbitaceae and Solanaceae. It has been reported as an outdoor pest of aubergine (*Solanum melongena*), *Benincasa hispida*, *Capsicum annuum*, cotton (*Gossypium* spp.), cowpea (*Vigna unguiculata*), cucumber (*Cucumis sativus*), *Cucurbita* spp., melon (*Cucumis melo*), peas (*Pisum sativum*), *Phaseolus vulgaris*, potato (*S. tuberosum*), sesame (*Sesamum indicum*), soyabean (*Glycine max*), sunflower (*Helianthus annuus*), tobacco (*Nicotiana tabacum*) and watermelon (*Citrullus lanatus*). It can infest flowers, for example of citrus in Florida (USA) or mango in India. It can also infest weeds (e.g. it was reported on *Vicia sativa*, *Cerastium glomeratum* and *Capsella bursa-pastoris* in unheated glasshouses in Japan Nagai & Tsumuki, 1990). In Japan, it does not attack tomato (*Solanum lycopersicum*), whose leaves have been shown to contain a feeding deterrent (Hirano *et al.*, 1994); in the Caribbean, however, *T. palmi* has been recorded on outdoor tomato crops (Pantoja *et al.*, 1988). In glasshouses, economically important hosts are aubergine, *Capsicum annuum*, chrysanthemum (*Chrysanthemum x morifolium*), cucumber, *Cyclamen*, *Ficus* and Orchidaceae. Within the EPPO region, *T. palmi* could infest, for example, *Capsicum annuum*, cucurbits, *S. melongena*, and ornamentals under glass.

Host list: *Abelmoschus esculentus*, *Ageratum sp.*, *Allamanda oenotherifolia*, *Allium cepa*, *Allium porrum*, *Alternanthera sessilis*, *Amaranthus dubius*, *Amaranthus spinosus*, *Apium graveolens*, *Arachis hypogaea*, *Arachnis*, *Argemone mexicana*, *Arracacia xanthorrhiza*, *Arundina graminifolia*, *Basilicum polystachyon*, *Bauhinia variegata*, *Benincasa hispida*, *Bidens pilosa*, *Bougainvillea sp.*, *Brassica oleracea var. capitata*, *Brassica oleracea*, *Brassica rapa*, *Callistephus chinensis*, *Canavalia ensiformis*, *Capsella bursa-pastoris*, *Capsicum annuum*, *Capsicum frutescens*, *Celosia argentea*, *Cerastium glomeratum*, *Chrysanthemum x morifolium*, *Chrysanthemum*, *Citrullus lanatus*, *Cleome sp.*, *Coriandrum sativum*, *Cosmos sulphureus*, *Cucumis melo*, *Cucumis sativus*, *Cucurbita maxima*, *Cucurbita moschata*, *Cucurbita pepo*, *Cyclamen persicum*, *Cyperus rotundus*, *Datura metel*, *Daucus carota*, *Dendrobium*, *Dianthus caryophyllus*, *Echinochloa colonum*, *Eleusine coracana*, *Eleusine indica*, *Eleutheranthera ruderalis*, *Eucalyptus sp.*, *Euphorbia heterophylla*, *Ficus racemosa*, *Fragaria vesca*, *Gerbera jamesonii*, *Glebionis segetum*, *Glycine max*, *Gossypium hirsutum*, *Helianthus annuus*, *Hemerocallis citrina*, *Hibiscus sp.*, *Hippeastrum puniceum*, *Ipomoea batatas*, *Ipomoea indica*, *Lactuca sativa*, *Linum usitatissimum*, *Luffa acutangula*, *Luffa aegyptiaca*, *Macrotyloma uniflorum*, *Mangifera indica*, *Manihot esculenta*, *Mimosa pigra*, *Momordica charantia*, *Morus alba*, *Nicotiana tabacum*, *Ocimum basilicum*, *Ocimum sp.*, *Ocimum tenuiflorum*, *Orchidaceae*, *Oryza sativa*, *Parthenium hysterophorus*, *Persea americana*, *Petroselinum crispum*, *Phaseolus lunatus*, *Phaseolus vulgaris*, *Phyllanthus emblica*, *Phyllanthus niruri*, *Physalis angulata*, *Piper nigrum*, *Pisum sativum*, *Plumbago auriculata*, *Plumeria rubra*, *Portulaca grandiflora*, *Prunus domestica*, *Prunus persica*, *Pyrus communis*, *Raphanus sativus*, *Rosa*, *Rottboellia cochinchinensis*, *Rubus*, *Salvia farinacea*, *Sauropus androgynus*, *Sesamum indicum*, *Sida acuta*, *Solanum betaceum*

, *Solanum lycopersicum*, *Solanum macrocarpon*, *Solanum mauritianum*, *Solanum melongena*, *Solanum muricatum*, *Solanum quitoense*, *Solanum torvum*, *Solanum tuberosum*, *Solanum violaceum*, *Sphagneticola trilobata*, *Spinacia oleracea*, *Stachytarpheta urticifolia*, *Strobilanthes calycina*, *Synedrella nodiflora*, *Tagetes patula*, *Urena lobata*, *Urochloa mutica*, *Vaccinium*, *Vanda*, *Vicia faba*, *Vicia sativa*, *Vigna angularis*, *Vigna mungo*, *Vigna radiata*, *Vigna unguiculata subsp. sesquipedalis*, *Vigna unguiculata*, *Vitis vinifera*, *Zantedeschia aethiopica*, *Zea mays*

GEOGRAPHICAL DISTRIBUTION

T. palmi was described in 1925 from Sumatra (Indonesia) (Karny, 1925). A few years later this species was discovered as far west as Sudan, and as far north as Taiwan. Since 1978, extensive outbreaks are reported yearly from Southern Japan (Sakimura *et al.*, 1986). Since 1985 it has been spreading in the Caribbean region following its introduction in Guadeloupe and Martinique (Bournier, 1986; Denoyes *et al.*, 1986; Guyot, 1988), and since 1988 there have been several limited outbreaks in the EPPO region which have been subsequently eradicated.



Africa: Cote d'Ivoire, Mauritius, Nigeria, Reunion, Sudan
Asia: Bangladesh, Brunei Darussalam, China (Anhui, Beijing, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Hubei, Hunan, Jiangsu, Jiangxi, Shandong, Sichuan, Xianggang (Hong Kong), Xizhang, Yunnan, Zhejiang), India (Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Delhi, Gujarat, Haryana, Himachal Pradesh, Jammu & Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Odisha, Punjab, Rajasthan, Sikkim, Tamil Nadu, Telangana, Tripura, Uttar Pradesh, West Bengal), Indonesia (Java, Sumatra), Iraq, Japan (Honshu, Kyushu, Ryukyu Archipelago, Shikoku), Korea, Democratic People's Republic of, Korea, Republic of, Lao People's Democratic Republic, Malaysia (Sabah, Sarawak, West), Maldives, Myanmar, Pakistan, Philippines, Singapore, Sri Lanka, Taiwan, Thailand, Vietnam
North America: Mexico, United States of America (Florida, Hawaii)
Central America and Caribbean: Antigua and Barbuda, Bahamas, Barbados, Costa Rica, Cuba, Dominica, Dominican Republic, Grenada, Guadeloupe, Haiti, Jamaica, Martinique, Netherlands Antilles, 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: Brazil (Distrito Federal, Espirito Santo, Goias, Minas Gerais, Sao Paulo), Colombia, Ecuador (Galapagos), French Guiana, Guyana, Peru, Suriname, Venezuela
Oceania: American Samoa, Australia (Northern Territory, Queensland), French Polynesia, Guam, Micronesia, Federated States of, New Caledonia, Palau, Papua New Guinea, Samoa, Wallis and Futuna Islands

BIOLOGY

In Japan, *T. palmi* can only overwinter on outdoor vegetation in a small part of Southern Japan (Yoshihara, 1982). Tsumuki *et al.* (1987) analysed the cold hardiness of *T. palmi* and concluded that it could not survive winter conditions in southern Honshu, and thus in most of Japan. However, another study (Nagai & Tsumuki, 1990) reported no reduction of adult populations at temperatures as low as -3 to -7°C in an unheated glasshouse in Japan. In Europe, an EFSA (2019) study concluded that most of Southern Europe had suitable climatic conditions for the establishment of *T. palmi* on outdoor vegetation.

At 25°C, the life cycle from egg to egg lasts 17.5 days. The life cycle differs little from that of most phytophagous Thripidae: the adults emerge from the pupa in the soil and move to the leaves or flowers of the plant, where they lay their eggs in the plant tissues. The second-stage larva enters the soil, develops there and pupates, thus completing the cycle. The specialized mouthparts are adapted for sucking. As a consequence the type of plant injury caused by feeding is always sucking damage. The life cycle and population dynamics of *T. palmi* in Japan have been reviewed by Kawai (1990a). At 25°C, the net reproductive rate, female fecundity and daily oviposition rate reached their maxima, the values for the last two parameters being 59.6 eggs per female and 3.8 eggs per day, respectively (Kawai, 1985). In Taiwan, the optimum temperature for population growth was found to be 25-30°C, and the number of generations possible in Central Taiwan was estimated as 25-26 per year (Huang and Chen, 2004). Likewise Cermeli and Montagne (1993) recorded that at 26°C, on leaves of *Phaseolus vulgaris*, the life cycle was 11.5 days, the net reproduction rate 18.3, the generation time 27.3 days and the intrinsic rate of natural increase was 0.125 individuals per female per day.

DETECTION AND IDENTIFICATION

Symptoms

T. palmi can be found in buds, cracks or crevices on host plants. At inspection, silvery feeding scars on the leaf surface, especially alongside the midrib and veins, can be seen. Damage has been described in Martinique by Denoyes *et al*. (1986) on aubergine and cucurbits. On fruits, this thrips causes corky lesions, that are characteristic on aubergines.

Heavily infested plants are characterized by a silvered or bronzed appearance of the leaves, stunted leaves and terminal shoots, and scarred and deformed fruits. Individuals may be found on all parts of many kinds of plants (Sakimura *et al.*, 1986).

Morphology

T. palmi can easily be mistaken for *T. flavus* Schrank or *T. tabaci* Lindeman, which are, economically less important thrips, commonly found on flower or vegetable crops. For the distinction between the three species, microscopic examination is necessary. *T. palmi* is characterized by the length of the female (about 1.3 mm compared with 1.7 mm in *T. flavus*), clear yellow body, with blackish setae, abdominal tergite II with four lateral setae, interocellar setae outside the ocellar triangle (*T. flavus*: interocellar setae inside), abdominal tergite VIII with complete comb in both sexes (*T. flavus* (male): comb incomplete). Strassen (1989) provides an account of characters distinguishing *T. palmi* from widespread thrips species in Europe. Confusions are also possible with other thrips species, such as *Frankliniella occidentalis*, *F. schultzei*, *Thrips nigropilosus*.

The EPPO Diagnostic Protocol for *T. palmi* (EPPO Standard PM 7/3, 2018) and ISPM 27 (FAO, 2010) provide recommendations on how to detect and identify the pest.

Detection and inspection methods

Thrips palmi is a small insect which is not easy to detect on plants, but its damage is visible: leaves silvered or bronzed, punctuations, corky marks on the fruits. The pest can be present on leaves, buds, fruits, flowers, but also in the soil as pupae. On cucurbits (e.g. melon, cucumber, watermelon), adults and larvae are notably present in the buds.

The eggs are impossible to observe because they are tiny and inserted into plant tissues. Fruits of aubergine, one of the preferred hosts of *T. palmi*, may harbour larvae and adults under the calyx. Within crops, *T. palmi* can be detected with blue or white sticky traps (Kawai, 1983). It is possible to detect *T. palmi* and evaluate population levels in the crops by taking leaves and placing them in a Berlese funnel.

PATHWAYS FOR MOVEMENT

T. palmi has only moderate dispersal potential by itself (it can fly on short distances and it can be easily transported by wind), but is liable to be carried on fruits, or plants for planting of host species, or in packing material. For example, it can be transported over long distances under the calyx of aubergines. For example *T. palmi* has been intercepted in several EPPO countries on consignments from Guadeloupe, Martinique, Mauritius, and Thailand. An analysis of interceptions of *T. palmi* in Europe and USA showed that the majority of them have been recorded on ornamentals (e.g. orchid cut flowers), aubergines and *Momordica charantia*, as well as on plants for planting (Vierbergen, 2001).

PEST SIGNIFICANCE

Economic impact

T. palmi, a polyphagous feeder with a wide host range, quickly builds up heavy infestations causing severe injuries. Both larvae and adults feed gregariously on leaves (first along the midribs and the veins), stems (particularly at or near the growing tips), flowers (among the petals and developing ovary) and fruits (on the surface), leaving numerous scars and deformities, and finally killing the entire plant. In tropical countries, *T. palmi* damages outdoor crops but in Japan, large-scale infestations of glasshouses have occurred (for example, on aubergine). In Hawaii (USA), *T. palmi* damages ornamental orchids. In Guadeloupe, *T. palmi* has had disastrous economic effects on cucurbit crops (melon, cucumber) and solanaceous crops (aubergine, Capsicum) which could be completely destroyed by this pest. Aubergine exports fell from 5000 tonnes in 1985 to 1600 tonnes in 1986. In Martinique, 37% of the vegetable crops of the two main cooperatives were attacked and 90% of aubergine crops (Guyot, 1988). In India, *T. palmi* is the vector of groundnut bud necrosis tospovirus, in Japan and Taiwan it vectors watermelon silvery mottle tospovirus (Honda *et al.*, 1989; Yeh *et al.*, 1992; Yeh & Chang, 1995). These viruses are closely related to tomato spotted wilt virus (TSWV), but *T. palmi* has not yet been demonstrated to vector TSWV. Other viruses which are known to be transmitted by *T. palmi* are calla lily chlorotic spot virus (Chen *et al*., 2005), capsicum chlorosis virus (Melzer *et al*., 2014), melon yellow spot virus (Kato *et al*., 2000), tomato necrotic ringspot virus (Seepiban *et al*., 2011), and watermelon bud necrosis virus (Gosh *et al*., 2021).

Control

T. palmi is difficult to control chemically in the field and especially in glasshouses due to its resistance to some active substances or perhaps because of the inaccessibility of a large proportion of the population as a consequence of a cryptic life cycle and feeding habits (Cannon *et al*., 2007). Insecticides such as imidacloprid and pyrethroids have been used, but may have serious effects on natural enemies (Nemoto, 1995). In Martinique (Bon & Rhino, 1989), profenofos, avermectin and carbofuran were the most effective insecticides on outdoor vegetables, while oxamyl, carbofuran, NTN, tokuthion and sulprophos gave the best results in cages (Ryckewaert, 1990). However, the majority of these products are highly toxic and not authorized on vegetable crops. In Guadeloupe, numerous chemical tests have been carried out but the results have been generally disappointing (Etienne & Van Waetermeulen, 1989). In trials under glass in Japan, none of the (repeated) insecticide applications gave more than 80% mortality. Supplementary cultural and mechanical methods were required to control the pest (Yoshihara, 1982; Kawai, 1990b). *T. palmi* populations can be monitored with blue sticky traps or water-tray traps (Layland *et al.*, 1994).

Many natural enemies have been identified across the world, such as predators belonging to different families (e.g. Anthocoridae (notably *Orius* spp.), Miridae, Lygaeidae, Berytidae, Coccinellidae, Aeolothripidae, Phlaeothripidae, Thripidae, Phytoseiidae), a few parasitoids and entomopathogenic fungi (Cox *et al*., 2006). Preliminary studies have been carried out concentrating on *Orius* spp. (Hemiptera: Anthocoridae) (Nagai *et al.*, 1988; Kawai, 1995) and *Amblyseius* spp. (Acarina: Phytoseiidae) (Kajita, 1986). At present, biological control of *T. palmi* by releasing predators, parasitoids or entomopathogens is not sufficiently efficient as it concerns mainly open field crops, and it is difficult to breed these beneficials in large quantities. In Japan, Kawai and Kitamura (1987) recommended IPM systems on cucumber in plastic greenhouses. IPM methods including prophylaxis, use of chemicals with specific active ingredients and natural biological control were developed in Martinique in the early 1990s and have enabled reduction of populations to acceptable levels (Ryckewaert, 1991). *T. palmi* has become rare in open field crops in recent years in the Lesser Antilles and other countries, mainly through the use of natural biological control and by avoiding the use of those pesticides which have a negative effect on beneficials (Ryckewaert, 2014).

Phytosanitary risk

In the EPPO region, *T. palmi* presents a serious threat to a wide variety of crops grown under glass, and many interceptions have been reported in this region (Viebergen, 2001). It could possibly establish on field crops in southern areas or in greenhouses of the EPPO region, as occurred for *Frankliniella occidentalis* (EPPO/CABI, 1996) which was originally considered to present a risk only under glass. Although *T. palmi* is not apparently a vector of TSWV, it does vector closely related viruses. In view of the situation which developed in Europe with *F. occidentalis* and TSWV, the vector capabilities of *T. palmi* merit close attention.

PHYTOSANITARY MEASURES

Because *T. palmi* is difficult to detect at low densities in consignments, inspections should be made during the growing season at the place of production. Alternatively, or additionally, consignments and/or the place of production should be treated against the pest.

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Datasheet history

This datasheet was first published in the EPPO Bulletin in 1989 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.

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