EPPO Datasheet: *Eotetranychus lewisi*

Last updated: 2020-11-20

IDENTITY

Preferred name: *Eotetranychus lewisi*
Authority: (McGregor)
Taxonomic position: Animalia: Arthropoda: Chelicerata: Arachnida: Acarida: Tetranychidae
Other scientific names: *Tetranychus lewisi* McGregor
Common names: Lewis spider mite
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EU Categorization: A1 Quarantine pest (Annex II A)
EPPO Code: EOTELE

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Notes on taxonomy and nomenclature

The close and confusing similarity between the genus names *Eotetranychus* and *Eutetranychus* causes problems in the literature. Another mite species with same specific epithet and same author, *Brevipalpus lewisi* McGregor 1949 (Tenuipalpidae) also occurs as a pest on citrus and other trees and can also be a source of confusion.

HOSTS

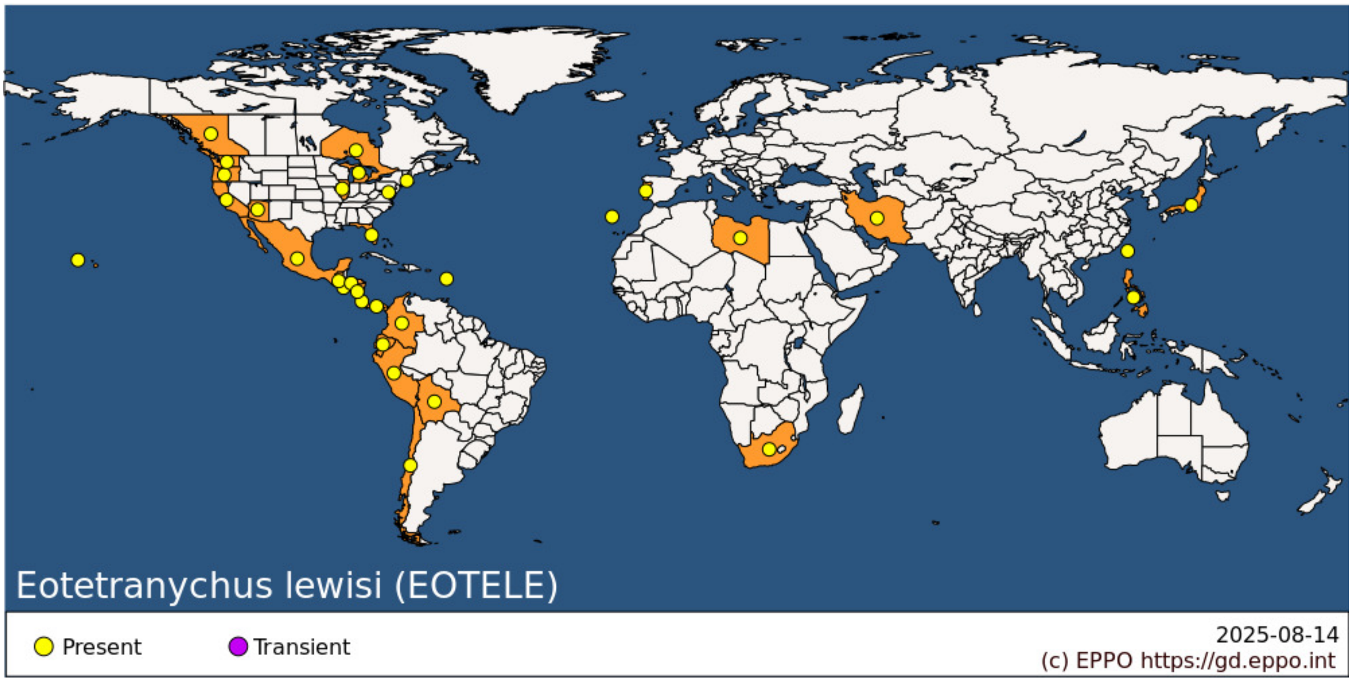
Citrus spp. (in USA), papaya (*Carica papaya*) (in Mexico, El Salvador, Honduras, Nicaragua and West Indies), peach (in Bolivia, Mexico and USA – Arizona), strawberry (in USA – California and Philippines), vines (in Chile and Madeira) and poinsettia (*Euphorbia pulcherrima*) (in USA – California, Florida, Costa Rica, El Salvador, South Africa, and Madeira and under greenhouses in USA – California, Oregon, Washington, Illinois, Michigan, Massachusetts, Maryland, Canada – Ontario, Japan – Honshu) are perhaps the most important hosts but the pest has also been recorded from the following: Euphorbiaceae: *Euphorbia* spp., *Croton* spp., *Poinsettia* spp., *Ricinus communis*, Leguminosae: *Acacia* spp., *Bauhinia* spp., *Mimosa* spp.; Rosaceae: *Prunus* spp., *Rubus* spp.; Solanaceae: *Solanum* spp., Salicaceae: *Populus* spp.; Sapindaceae: *Cardiospermum* spp.; Pinaceae: *Pinus* spp.

Host list: *Abutilon malacum*, *Acacia pennatula*, *Ambrosia confertiflora*, *Antigonon leptopus*, *Argythamnia lanceolata* , *Arracacia xanthorrhiza*, *Bauhinia picta*, *Bauhinia purpurea*, *Bauhinia sp.*, *Bixa orellana*, *Bocconia arborea*, *Brickellia californica*, *Brugmansia arborea*, *Cardiospermum corindum*, *Cardiospermum halicacabum*, *Carica papaya*, *Ceanothus hybrids*, *Ceanothus sp.*, *Ceiba acuminata*, *Citrus sp.*, *Citrus x aurantium var. paradisi*, *Citrus x aurantium var. sinensis*, *Citrus x limon*, *Citrus*, *Cleome sp.*, *Cnidoscolus sp.*, *Crotalaria sp.*, *Croton ciliatoglandulifer* , *Croton glabellus*, *Croton sonorae*, *Croton sp.*, *Cucurbita sp.*, *Encelia frutescens*, *Erythrina esculenta*, *Euphorbia heterophylla var. cyathophora*, *Euphorbia heterophylla*, *Euphorbia marginata*, *Euphorbia pulcherrima*, *Euphorbia sp.*, *Euphorbia*, *Ficus carica*, *Ficus sp.*, *Fragaria x ananassa*, *Gossypium hirsutum*, *Haplopappus sp.*, *Heterotheca sp.*, *Hydrangea arborescens*, *Ipomoea sp.*, *Isocoma pluriflora*, *Jatropha cardiophylla*, *Koelreuteria paniculata*, *Lycium sp.*, *Malpighia sp.*, *Malus domestica*, *Medicago polymorpha*, *Mimosa aculeaticarpa*, *Mimosa laxiflora*, *Monarda sp.*, *Olea europaea*, *Pinus cembroides*, *Pinus edulis*, *Pinus nelsonii*, *Pinus ponderosa*, *Populus deltoides*, *Populus tremuloides*, *Prunus domestica*, *Prunus persica*, *Prunus sp.*, *Pyrus communis*, *Quercus sp.*, *Ricinus communis*, *Rosa sp.*, *Rubus glaucus*, *Rubus idaeus*, *Rubus sp.*, *Schoenoplectus californicus*, *Sechium edule*, *Solanum elaeagnifolium*, *Solanum sp.*, *Sphaeralcea angustifolia*, *Sphaeralcea orcuttii*, *Trifolium*, *Tropaeolum tuberosum*, *Vachellia constricta*, *Vitis sp.*, *Vitis vinifera*, *Xanthisma spinulosum*

GEOGRAPHICAL DISTRIBUTION

Country of origin not known, possibly Central America where *E. lewisi* occurs on native *Euphorbia* spp. In the

Northern half of USA, Canada and Japan it was only recorded under greenhouses.



EPPO Region: Portugal (mainland, Madeira)
Africa: Libya, South Africa
Asia: Iran, Islamic Republic of, Japan (Honshu), Philippines, Taiwan
North America: Canada (British Columbia, Ontario), Mexico, United States of America (Arizona, California, Florida, Hawaii, Illinois, Maryland, Massachusetts, Michigan, Oregon, Washington)
Central America and Caribbean: Costa Rica, El Salvador, Guadeloupe, Guatemala, Honduras, Nicaragua, Panama
South America: Bolivia, Chile, Colombia, Ecuador, Peru

BIOLOGY

On most plants, *E. lewisi* feeds on the underside of the leaves, preferring the regions close to the main leaf veins but eventually the population occupies the whole of the underside of the leaf. On citrus, the eggs are laid in depressions on the surface of the fruit and the mites feed on the developing fruit and do not usually damage the leaves. On poinsettia, the mean generation time ranges from 19.8 days at 20 °C to 13.2 days at 28 °C. The thermal summation for egg to adult development is 159 degree-days with a temperature threshold of 8.3 °C. The optimal R_0 (number of offspring per female) is 17.7 at 24 °C and mortality increases rapidly over 28 °C (Lai and Lin, 2005). The life cycle from egg to adult ranges from 32.7 days at 15 °C to 10.6 days at 25 °C in experiments on strawberry (Kaur & Zalom, 2017) and averages 12 days for the male and 14.5 days for the female (Jeppson *et al.*, 1975) on citrus in California (USA) with temperatures ranging from 17 to 23 °C.

DETECTION AND IDENTIFICATION

Symptoms

On citrus, the mites feed mostly on the fruit resulting in a stippling of the rind, heavy infestations producing silvering on lemons and silvering or russeting on oranges. Although webbing may be profuse and conspicuous as it collects dust, there is generally no damage to the leaves (Jeppson *et al.*, 1975).

On poinsettia, lightly infested leaves have a speckled or peppered appearance produced by the large number of clear yellow spots or yellowish patches of varying size with indefinite borders all over the leaf, while the undersides of leaves show conditions varying from areas of light-green colouration to obvious chlorosis. Sometimes there is an intense yellow speckling on both sides of the leaves. In severe attacks, the interveinal areas turn yellow and contrast strongly with the green veins. This condition can be mistaken for that caused by zinc or magnesium deficiency (Ochoa *et al.*, 1991). Heavy infestation on the undersides of leaves produces profuse webbing, especially around the flower centres, and chlorotic leaves, eventually leading to extensive leaf drop (Doucette, 1962). Injury caused to *Ricinus communis* is similar to that caused to poinsettias (Doucette, 1962).

On papaya, feeding causes chlorosis and distortion of the young leaves, resembling that caused by virus diseases. In severe infestations, the young leaves lose their laminas, while the leaf veins remain. This condition especially can lead to a mistaken diagnosis of a virus disease in commercial plantations. Damage to older leaves resembles that on poinsettias, which can be confused with that caused by hormonal herbicides (Ochoa *et al.*, 1991).

On strawberry, symptoms are chlorosis and bronzing of the leaves where feeding occurs, light to high webbing and reduction in fruit production at high mite densities (Howell and Daugovish, 2013).

Morphology

Eggs

Spheroidal, whitish to faintly orange in colour, with a short spike arising from the top of the egg without ‘guy-line’ threads from the end of the spike to the plant (in contrast to that of the citrus red mite, *Panonychus citri*).

Larva

There is no published description of the larval and nymphal stages.

Adult

The body of the female is light-yellow to whitish in colour, the legs and gnathosoma are whitish with a slight reddish tone (Ochoa *et al.*, 1991). Identification requires examination of cleared and mounted specimens of both sexes by transmitted light microscopy. Diagnostic descriptions and keys are provided by Jeppson *et al*., (1975) and Smith-Meyer (1974, 1987). Body length ranges from 270 µm to 360 µm.

The EPPO Diagnostic Protocol for *Eotetranychus lewisi* provides recommendations on how to detect and identify the pest (EPPO Standard PM 7/68, 2006).

Detection and inspection methods

The mites can be present on plant materials, especially potted plants (poinsettias) or cuttings (poinsettias) and plants for planting (strawberries, raspberries). They can also be present on citrus fruits. At low densities, spider mites are extremely difficult to detect. Inconspicuous (less than half a millimetre) they are invisible to the naked eye. Inspection should focus on small whitish, brownish or yellow spots (easily confused with other causes such as virus symptoms or superficial wounds). An examination of the undersides of the leaves under a stereo-microscope can then confirm (or not) the presence of spider mites, generally associated with white exuviae and webbing. High mite densities are easier to detect, with the same symptoms on a large scale and webbing on the underside of the leaves.

PATHWAYS FOR MOVEMENT

Spider mites are mainly dispersed by wind currents and in the field and this is probably the main means of dispersal for *E. lewisi.* In glasshouses workers constitute the main dispersal factor between plants. Long distance dispersion is primarily by transport of infested plant material.

In glasshouses, infestation of poinsettias is thought to have been brought about by the introduction of infested cuttings from warmer areas and/or infested glasshouses. Importation of poinsettia from countries where the pest occurs remains the main pathway for introduction to the EU (EFSA, 2017) and this is probably the case for the rest of the EPPO region, especially around the Christmas period, when most poinsettias are sold.

Plants for planting of grapevine, strawberry, raspberry, and other hosts such as peach can also constitute a pathway. However, the import of many of these commodities is prohibited or strictly regulated in the EU and therefore the risk of introduction with these commodities was assessed as lower (EFSA, 2017). In EPPO countries where such restrictions may not exist, the importation of host plants for planting may be a pathway for introduction of the pest.

Citrus fruits (oranges and lemons) are not considered as a possible pathway as the pest is unlikely to survive post-harvest treatments and transfer to host plants after import (EFSA, 2017).

PEST SIGNIFICANCE

Economic impact

In the USA, *E. lewisi* populations increase most rapidly on poinsettias, *Euphorbia marginata*, and *Ricinus communis* (both Euphorbiaceae) under glasshouses. If not controlled, the resulting leaf discoloration and leaf drop devastate the sale value of the plants. Impact on sales of poinsettias and more generally Euphorbiaceae constitute the main economic losses due to *E. lewisi*.

On citrus, *E. lewisi* is considered to be of very minor importance (Doucette, 1962), occurring occasionally in Southern California (USA).

On strawberry, *E. lewisi* emerged as a pest of economic importance in California ten years ago (Dara, 2011; Howell and Daugovish, 2013).

A negative economic impact has been reported on papaya (Ochoa *et al.* 1991) in Central America and on peach (Pérez-Santiago *et al.* 2002) in Mexico.

Control

Acaricides used to control other spider mites effectively control *E. lewisi* (Jeppson *et al.*, 1975). The most recent data (Dara, 2011) highlighted abamectin, acequinocyl, bifenazate and spiromesifen as effective in controlling *E. lewisi* on poinsettia and the author recommended the use of approved acaricides on strawberries. Bethke *et al.* (2004) and Gilrein (2006) recommended etoxazole, fenproximate, hexythiazox and also acequinocyl and bifenazate on poinsettia. Other active substances, that are no longer authorized in the EU have been used in the past: ethion, bifenthrin and propargite (Pérez-Santiago *et al.*, 2002), parathion, demeton, dicofol and sulfotep (Doucette, 1962).

On citrus, signs of infestation on fruits are removed during the harvesting process. Treatments used against other tetranychid mites will control injurious populations if they should occur.

The phytoseiid mite *Neoseiulus californicus* was found associated with *E. lewisi* during the outbreak in American greenhouses growing poinsettias in 1958. It was thought that this species had been at least partly responsible for keeping populations in check in later years (Doucette, 1962). More recently Ho (2007) found *Amblyseius longispinosus* and *Phytoseius minutus* (Acari Phytoseiidae) but also some other natural enemies *Scolothrips* sp., cecidomyiid larvae, *Oligota* larvae, and *Orius* larvae feeding on *E. lewisi*. In laboratory experiments on strawberry plants *Neoseiulus californicus*, *Neoseiulus fallacis* and *Amblyseius andersoni* were found preying on *E. lewisi*. It is not the case of *Phytoseiulus persimilis* which by preying only on *Tetranychus urticae* favors the development of *E. lewisi* in mixed infestations (Howell and Daugovish, 2013).

Phytosanitary risk

Eotetranychus lewisi presents a risk to glasshouse poinsettias. It has already been recorded and eradicated twice in the EPPO region. Once introduced, it could escape and establish outdoor in countries with mild winters, although this is considered as a rare event (EFSA, 2017).

Citrus fruits imported from third countries where the mite occurs, raspberry and strawberry plants for planting imported from third countries where the mite occurs while providing routes for possible pest entry to the EU, do not realistically provide opportunities for *E. lewisi* to establish within the EU in the next 10 years (EFSA, 2017). This is due to either the highly controlled conditions under which strawberry and raspberry propagating material and plants for planting are grown and managed, or due to the handling and shipping conditions used to import citrus fruit (EFSA, 2017).

On strawberry and raspberry, grapevine and peach similar impacts to those observed respectively in the USA, Chile and Mexico could be expected. Although, following its detection in Madeira, *E. lewisi* is not known to have caused any noticeable impacts (EFSA, 2017).

PHYTOSANITARY MEASURES

Any imported material of poinsettias (or other glasshouse ornamental hosts) should come from a place of production found free from the pest. Plants for planting (grapevine, strawberry and raspberry) should also come from an area or a place of production free of *E. lewisi*.

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Datasheet history

This datasheet was first published in the second edition of 'Quarantine Pests for Europe' in 1997 and revised in 2020. 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).

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