Diagnostics
Diagnostic

Eotetranychus lewisi

Specific scope

This standard describes a diagnostic protocol for *Eotetranychus lewisi*.

Specific approval and amendment

Approved in 2005-09.

Introduction

Eotetranychus lewisi is a polyphagous spider mite that feeds upon the leaves and fruits of more than 60 recorded hosts (Bolland *et al*., 1998). On citrus, it is considered to be of minor importance, but it presents a risk to glasshouse poinsettias and other glasshouse ornamentals in the EPPO region. From southern, central and south-western USA, the species has spread to Madeira (Portugal), Norway (in 1999 on imported poinsettias in a single glasshouse), Germany, Libya, South Africa, Japan, Taiwan, Philippines and some other states of the USA (Hawaii, Massachusetts, Michigan, Washington). Dispersal occurred mainly on poinsettia cuttings.

Identity

Name: *Eotetranychus lewisi* (McGregor).
Synonyms: *Tetranychus lewisi* McGregor.
Taxonomic position: *Arachnida: Acarina: Tetranychidae*.
EPPO code: EOTELE.
Phytosanitary categorization: EPPO A1 list no. 205, EU Annex designation II/A1.

Detection

The most likely hosts for detection are *Citrus* spp. (in the USA), pawpaws (*Carica papaya*) (in Mexico, El Salvador, Honduras and Nicaragua) and poinsettias (*Euphorbia pulcherrima*) (in the USA, Costa Rica, El Salvador, South Africa, and Madeira) but *E. lewisi* has also been recorded from many other species (EPPO/CABI, 1997).

On most plants, *E. lewisi* feeds on the underside of the leaves, preferring the regions close to the main veins. On *Citrus*, the mites feed mostly on the fruit causing stippling of the rind, heavy infestations produce silvering on lemons and silvering or russetting 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 citrus, the eggs are laid in depressions on the surface of the fruit.

Mature leaves are preferred on poinsettias (Carmona, 1992). 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 coloration 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 flowering parts, 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 pawpaw, 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 can lead to a mistaken diagnosis of a virus disease in commercial plantations. Damage to older leaves resembles that on poinsettias, and can be confused with that caused by hormonal herbicides (Ochoa *et al*., 1991).

Mixed populations of *E. lewisi* and *Tetranychus urticae* may occur. In such instances the resemblance between the species may hamper the detection of *E. lewisi*.

Identification

Family *Tetranychidae*

The spider mites (*Tetranychidae*) are represented by at least 1233 species belonging to 2 subfamilies and 73 genera (Bolland *et al*., 1998; Migeon & Flechtmann, 2004). *Tetranychidae* are characterized by having the stylophore eversible, with long slender whip-like chelicerae; the peritremes are simple or anastomosing distally, arising from the base of the stylophore; tarsus I and II usually have duplex setae; the ambulacra has tenent hairs; the tarsal claws and empodia are either padlike or clawlike; the palpal tibia forms a clawlike complex with the palpal tarsus.

Genus *Eotetranychyus*

At present the genus *Eotetranychus* consists of 180 species and is the second largest genus in *Tetranychidae*. *Eotetranychus* can be recognized by the presence of two pairs of para-anal setae; the duplex setae on tarsus I are distal and adjacent; the empodium split into three pairs of ventrally directed hairs and the idiosoma with striae with small lobes, are longitudinal on the prodorsum and transverse on the opisthosoma (Bolland *et al*., 1998; Baker & Tuttle, 1994; also for technical terms).

Species *Eotetranychus lewisi*

Tetranychid mites develop through five stages: egg, larva, protonymph, deutonymph and adult. The egg of *E. lewisi* is spheroidal, whitish to faintly orange in colour, with a short spike or stipe arising from the top of the egg, and without a 'guy-line' of silk threads from the end of the spike to the plant as found in other tetranychid species, e.g. the citrus red mite, *Panonychus citri*. There are no published descriptions of the larval and nymphal stages.

Identification requires examination of cleared and mounted specimens of adult specimens of both sexes by transmitted light microscopy. Fresh adult specimens can be mounted in Hoyer's or Berlese's medium (or with a slight variation of these methods). Heating (45°C) for 2–3 days is necessary for a proper maceration of the specimens. Higher temperatures cause the medium to bubble or an excessive contraction of the mountant. Positive identification of this species is only possible from adult male specimens positioned laterally as the distinguishing characters are found on the aedeagus. There are no fully comprehensive keys to all the known species of *Eotetranychus*. There are, however, regional keys that can be used, e.g. Tuttle and Baker (1968) (South-western USA) and Smith-Meyer (1987) (Africa).

The female *E. lewisi* body is light-yellow to whitish in colour, the legs and gnathosoma are whitish with a slight reddish tone (Ochoa *et al*., 1991) but coloration is not a reliable character. Diagnostic descriptions and keys are provided by Jeppson *et al*. (1975) and Smith-Meyer (1974, 1987). There are no keys that will clearly identify female specimens of this species. Pritchard and Baker (1955) provide a key to the North American species as known then, but this will only narrow the identification down to one of six species, *E. lewisi* amongst them. For other available keys for *Eotetranychus*, male characters are necessary.

E. lewisi can easily be mistaken morphologically for *T. urticae*, which is very common worldwide. *T. urticae* females are, however, slightly larger than *E. lewisi* (0.5 mm and 0.36 mm, respectively), and normally have a single pair of lateral large feeding spots, while *E. lewisi* females have two or more lateral spots. *E. lewisi* may be separated from other species of *Eotetranychus* by the following combination of characters: the ventral body striae in the female immediately anterior to the genital flap and on the flap itself run transversely; tibiae I and II in both sexes bear 9 and 8 tactile setae, respectively (Fig. 1a–d), and there are 5 tactile setae on tarsus I proximal to the duplex setae (Fig. 1a,c); the peritremes are hooked distally in both sexes (Fig. 1e). However, none of these characters are exclusive to *E. lewisi*. The shape of the aedeagus is the single key character, distinctive in having a gentle sigmoid bend without a distinct distal knob or tip (Fig. 1f).

Discriminatory characters

Male. Body length about 270 µm. Palpal tarsus with spinneret about as broad as long. Tibia I with 9 tactile setae (Fig. 1c); tibia II with 8 tactile setae (Fig. 1d). Aedeagus distinctive in gradually tapering to form a broad sigmoid ventral bend; distinct distal tip or knob absent; dorsal margin of shaft concave (Fig. 1f). Solenidia of tarsi III–IV proximal, not as long as tactiles (Fig. 1c, d).

Female. Body length about 360 µm. Dorsal body setae extending beyond bases of next row. Stylophore narrowing anteriorly, rounded. Peritremes hooked distally (Fig. 1e). Spinneret short, about one and a third times as long as broad. Tarsus I with 5 tactile setae proximal to duplex setae (Fig. 1a); tibia I with 9 tactile setae (Fig. 1a); tibia II with 8 tactile setae (Fig. 1b). Solenidia on tarsi III–IV proximal, not as long as tactiles. Prodorsal and opisthosomal striae lobes broader than tall. Ventral striae transverse to genital flap, lobed; flap with transverse striae.

For a positive identification, the procedures for detection and identification described in this protocol should have been followed. A good slide preparation should be made of a teneral male and/or female. All the main morphological characters should be seen and the specimen should match the morphological description and illustration. The specimen should be identified as *Eotetranychus* using the mentioned keys to the genus. The specimen should preferably be compared with other slide-mounted material which has been identified by a specialist in *Tetranychidae*.

Reporting and documentation

Guidelines on reporting and documentation are given in EPPO Standard PM7/– (in preparation)

Further information

Further information on this organism can be obtained from:

G. Vierbergen, Plant Protection Service, Section of Entomology, POBox 9102, 6700 HC Wageningen (NL).

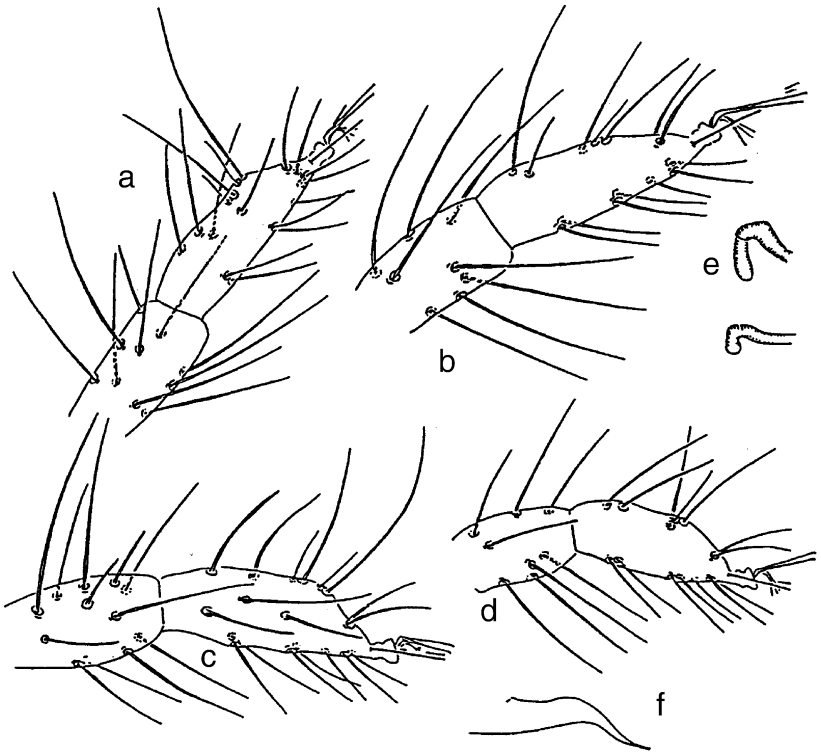

Fig. 1 *Eotetranychus lewisi*. Female: a. tibia – tarsus I; b. tibia – tarsus II; e. Peritreme. Male: c. tibia – tarsus I; d. tibia – tarsus II; f. Aedeagus. *Duplex setae; arrows = empodium. From Baker & Tuttle (1994).

Acknowledgements

This protocol was originally drafted by G. Vierbergen, Plant Protection Service, Wageningen (NL).

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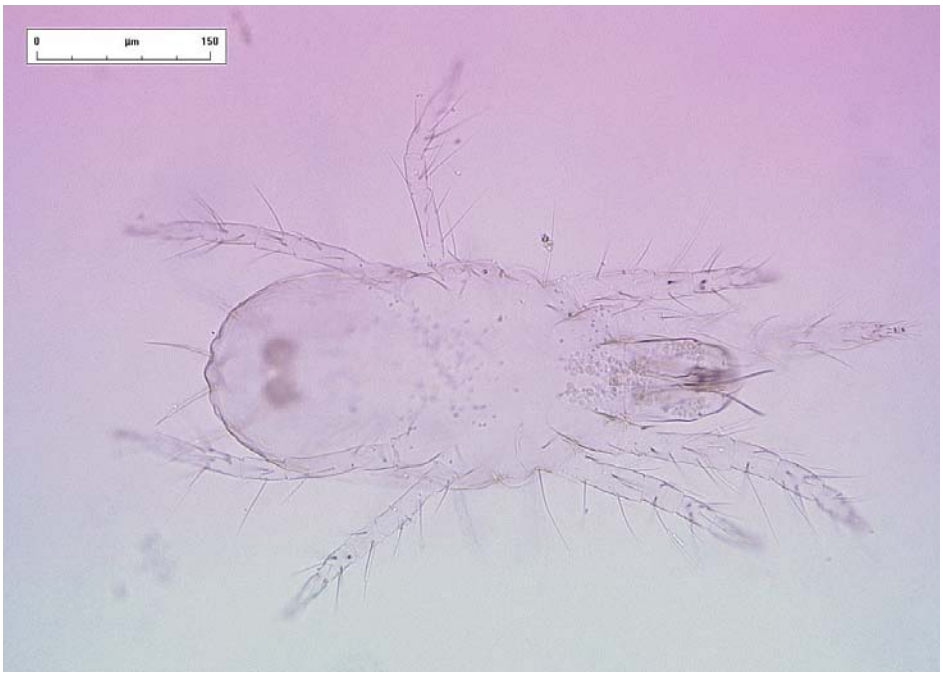
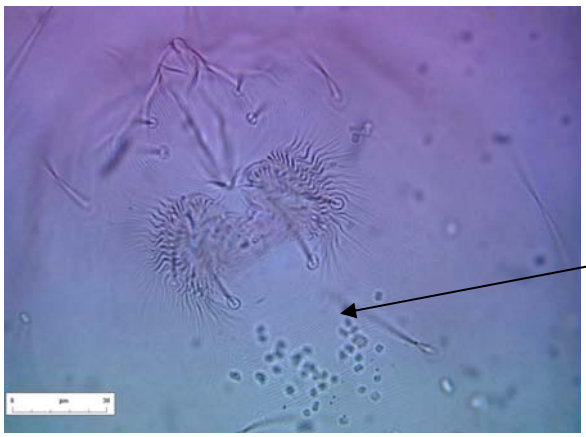
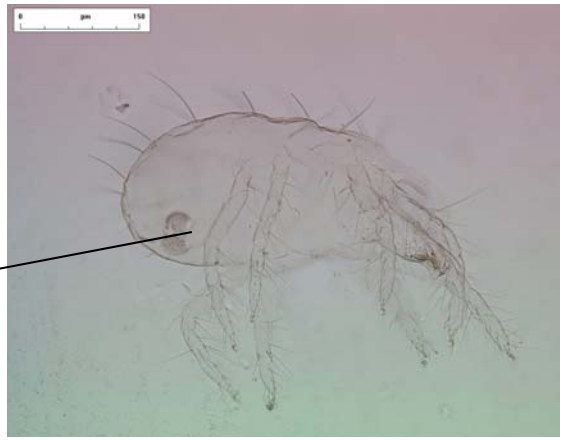
Web Fig. *Eotetranychus lewisi* (McGregor) from *Erythrina edulis*, Limatambo (Peru) 9 IX 1987 (Guttierrez collection)



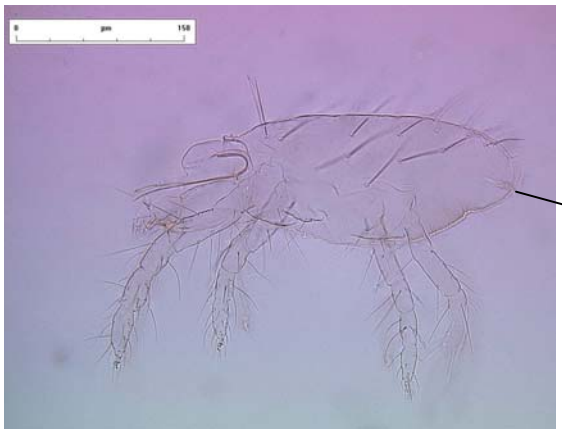
Adult : general dorso-ventral view



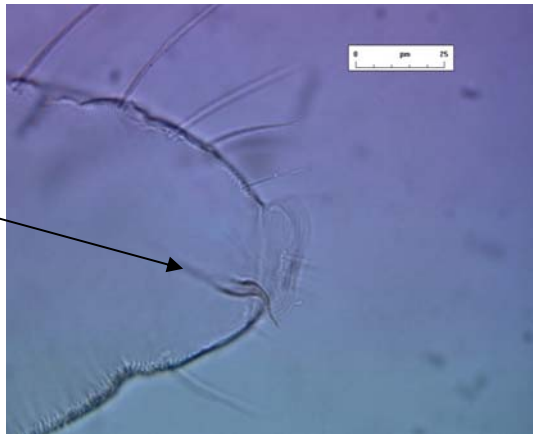
Caudoventral aspect of female opisthosoma with striae



Female: lateral view



Male: lateral view



Male: aedeagus