Which thrips is that?

A guide to the key species transmitting

Tomato Spotted Wilt Virus in NSW

Western flower thrips

This brochure is a guide to identifying key species of thrips which are vectors of tomato spotted wilt virus (TSWV) in vegetables and ornamentals in NSW. These species have also been recorded as vectors of other viruses. Individuals are not necessarily infected with the virus, but in a virus-susceptible crop, tolerance for thrips may be very low. Separation from non-vector thrips species is therefore important. Each crop and geographic area has its own complex of thrips species. Relatively uncommon thrips may be locally abundant, and may even cause crop damage. If yours do not fit the description of those shown, and if they are numerous enough to cause concern, contact your local Department of Agriculture/Primary Industries or pest scout to have them identified by an expert. Be aware that specimens may fade over time: thrips are best examined fresh.

Key species

Tomato thrips

- Western flower thrips, *Frankliniella occidentalis* (WFT) (vegetables, ornamentals, fruit)
- Tomato thrips, *Frankliniella schultzei* (mostly vegetables)
- Onion thrips, *Thrips tabaci* (mostly vegetables)

Key characteristics identifying thrips at low magnification (40x)

- **Colour** (there may be seasonal and local differences between populations)
- **Setae** (strong hairs) - presence or absence on prothorax or abdomen
- **Number of antennal segments**
- **Colour of ocelli** (three simple eyes on top of head, between compound eyes)
- **Size**

Onion thrips

Key biological differences

- **Sex:** males, where present, are about two-thirds the size of females. WFT and tomato thrips are predominantly male at very low population densities, usually early in the season, and mostly female when numerous. Onion thrips are always female in Australia.

- **Seasonal incidence:** onion thrips are most numerous in early summer; tomato thrips and western flower thrips in mid to late summer. Dark forms of onion thrips and western flower thrips, often larger, may occur in winter.

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Major pest thrips transmitting TSWV in NSW

Western flower thrips,
Frankliniella occidentalis
Largest of the three species, female 1.4-1.8 mm, male 0.9-1.1 mm.
Note black tip on female abdomen.


Female top side


Female underside


Male

Tomato thrips,
Frankliniella schultzei
Smaller species, female 1.2-1.7 mm, male 1.0-1.3 mm.
Note dark-brown to black abdomen with banded appearance, clear wings, dark legs.


Female top side


Female underside


Male

Onion thrips,
Thrips tabaci
Smallest species, female 1.0-1.2 mm, no males.
Note more uniform colour of abdominal segments.


Female top side


Female underside

No male

Note that sizes and colours vary, even within a species, and alone are not enough to separate species, particularly in the field. Adult thrips have two pairs of fringed wings. Larvae are white or yellow, wingless, with few distinguishing characteristics.

Where to look for thrips in the crop

Adult thrips, particularly WFT and tomato thrips, are usually found in flowers, where they feed on nectar and pollen. Thrips are also found on leaves (mostly undersides), in growing points, and on fruit. Eggs are inserted into flowers, leaves or fruit. These hatch after a few days into white or yellow larvae (wingless). Only larvae can acquire virus, and only adults can transmit it. All three species drop off the plant as mature larvae to pupate at ground level. Onion thrips prefer low growing herbage. Weeds may harbour reservoirs of thrips and virus and often serve as a breeding ground for spring populations that then move into crops. All three thrips species persist all year, and do not hibernate.

Thrips are best collected from flowers, but can be collected from leaves by washing through fine-screened sieves. Transfer thrips to 70% alcohol to preserve for identification. Yellow sticky traps are useful for monitoring, particularly for the presence or absence of any of the key species, but are also likely to catch non-pest species. Thrips on sticky traps are often damaged, and expertise is needed to identify them with certainty. Plague thrips is the most common non-vector species likely to be encountered. It can be identified using the related *Which thrips is that? A guide to the key species damaging strawberries*, available from NSW Department of Primary Industries Bookshop, Orange.

Where to look for thrips damage

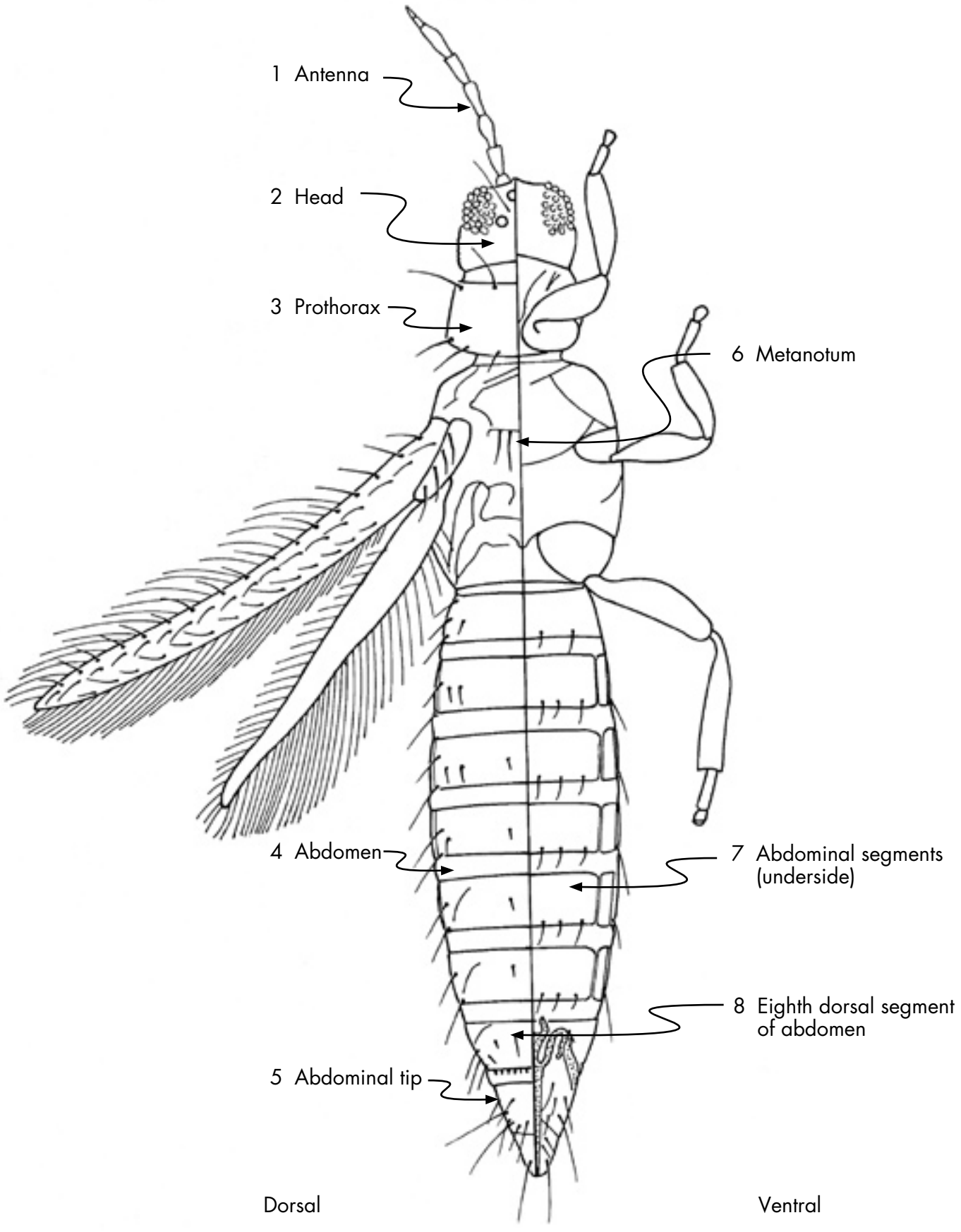
Adult and larval thrips damage flowers, fruit and leaves. In flowers, feeding causes silvering, streaking, bronzing or distortion of petals and sepals. Feeding on immature fruit by WFT may leave small scars that elongate with fruit growth. Later feeding on mature fruit causes silvering or russeting; oviposition punctures cause ghost spotting/pansy spot. Feeding on the undersides of the leaves results in silvery patches and small scars. The symptoms of TSWV vary, but may include yellowing, retarded growth, rings or necrotic spots, or multicoloured fruit. Plants are most susceptible to TSWV when young. Crops (and weeds) should be scouted regularly for symptoms of TSWV, and infected plants removed promptly where found. Familiarity with crops and weeds that are TSWV hosts in your area is also important. Not all infected plants show symptoms; expression of symptoms may also be delayed for several weeks after initial infection.

Above: Onion thrips with silvering damage on underside of leaf

Above: Corky scars on capsicum fruit (WFT)

Above: Streaking and distortion of gerbera petals (WFT)

Generalised diagram of an adult thrips



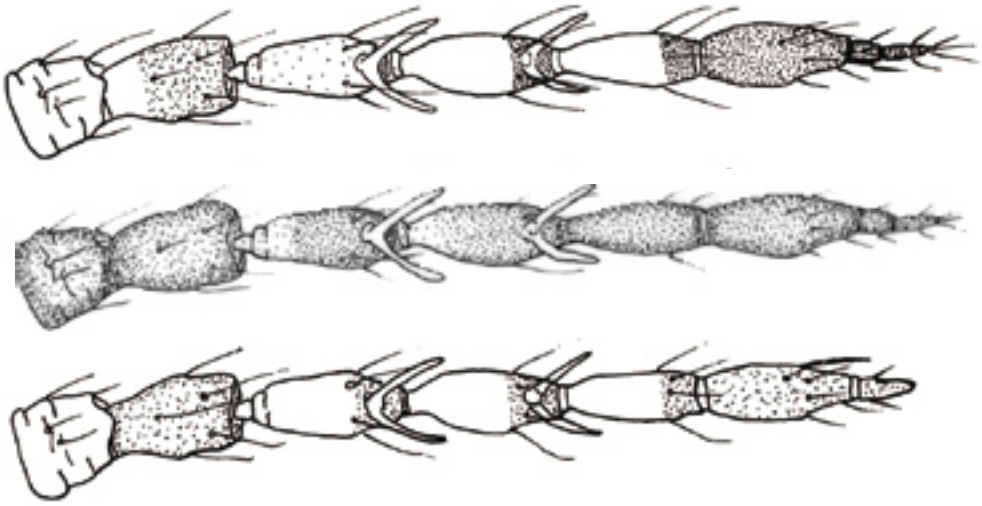
Differentiating characteristics under low power magnification (40x)

1. Antennae

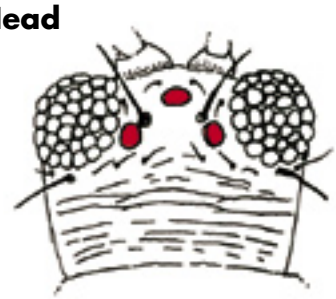
Western flower thrips: eight segments; two end segments small, narrow, black; general appearance banded.

Tomato thrips: eight segments; two end segments small, narrow; dusky except base of third and fourth segments paler.

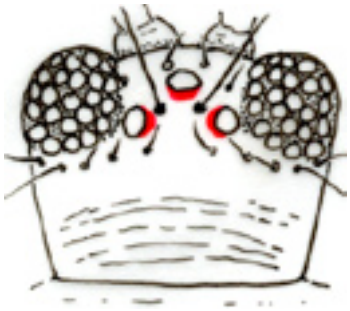
Onion thrips: seven segments; first pale, end one small, blunt.



2. Head



Western flower thrips: ocelli red.



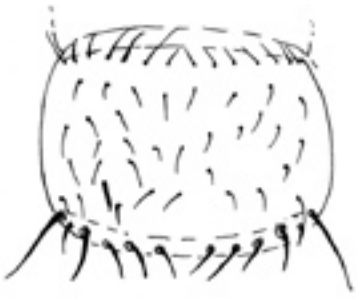
Tomato thrips: ocelli pale but with partial red rims.

Onion thrips: ocelli pale.

3. Prothorax

Western flower thrips and tomato thrips: four pairs of strong bristles, one pair at each corner.

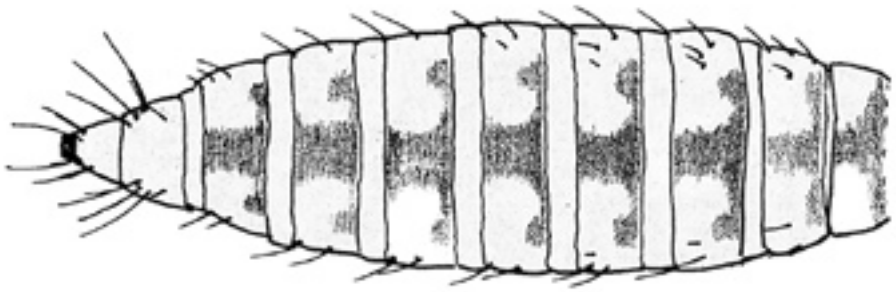
Onion thrips: two pairs of strong bristles, rear corners only.



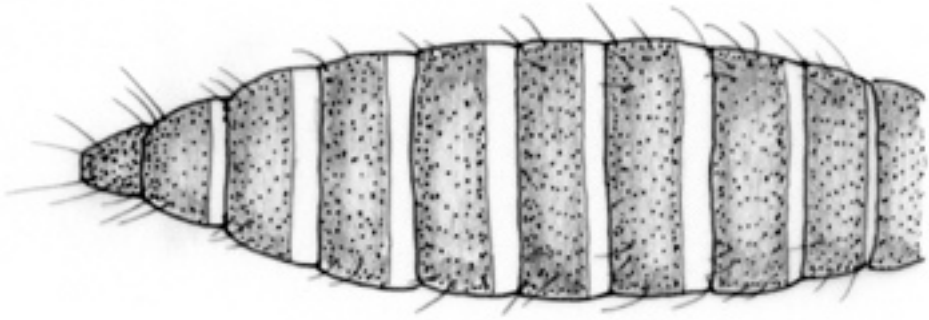
Differentiating characteristics under low power magnification (40x)

4. Abdomen

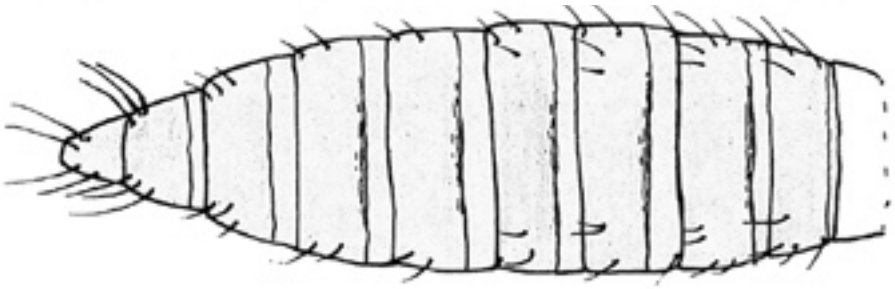
Western flower thrips: pale yellow to orange; dorsal side has dark markings down centre; darker in winter.



Tomato thrips: dark brown; paler between segments.

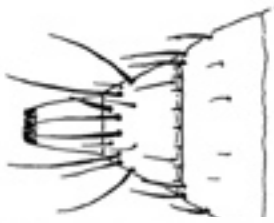


Onion thrips: variable, dark to light brown/grey, but fairly uniform over abdomen.

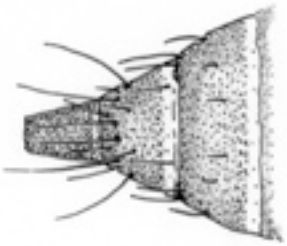


5. Abdominal tip

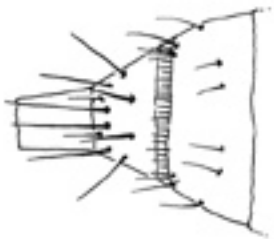
Western flower thrips: extreme tip black.



Tomato thrips: all segments dark.



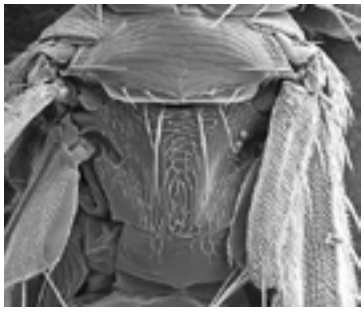
Onion thrips: uniform brown/grey colour.



Differentiating characteristics under high power magnification (100x)

These are scanning electron microscope pictures. Characteristics are visible also in slide mounts of thrips viewed with a compound microscope.

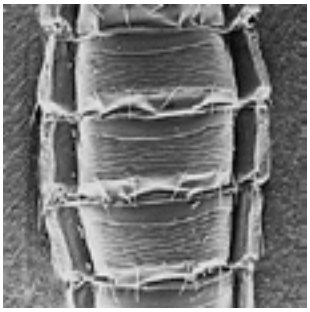
6. Metanotum



Western flower thrips and tomato thrips: median pair of metanotal setae (hairs) arising at front margin.

Onion thrips: median metanotal setae (hairs) arising behind front margin.

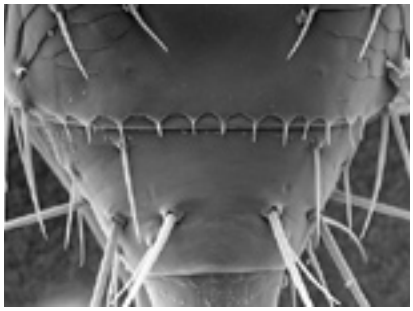
7. Abdominal segments (underside)



Western flower thrips and tomato thrips: one row of setae (hairs) on lower margin of each segment.

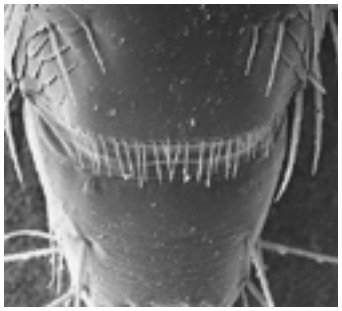
Onion thrips: one row of setae (hairs) on lower margin of each segment.

8. Eighth dorsal segment of abdomen



Western flower thrips: comb broad-based, complete.

Tomato thrips: similar to western flower thrips but comb incomplete, absent or at sides only.



Onion thrips: comb complete, long and fine.

Sources of further information

Further reading on thrips identification:

- *I I E Guides to Insects of Importance to Man - 2. Thysanoptera*. 1992. J.M.Palmer, L.A.Mound and G.J.du Heaume. CAB International, UK.
- *Thrips ID: Pest thrips of the world* (CD) 2001. G.M.Moritz, D.Morris and L.A.Mound. ACIAR. CSIRO Publishing, Collingwood, VIC.
- *Which thrips is that? A guide to the key species damaging strawberries*. NSW Department of Primary Industries Bookshop, Orange, NSW, http://www.agric.nsw.gov.au/reader/bookshop.

Further reading on thrips of importance as TSWV vectors:

- *Integrated Pest Management in Ornamentals/Greenhouse Vegetables/Lettuce* Information Guides and Field Identification Guides, NSW Department of Primary Industries Bookshop Tel: (02) 6391 3458 or 1 800 028 374, http://www.agric.nsw.gov.au/reader/bookshop.
- State Departments of Agriculture/Primary Industries websites.

Help with thrips identification:

- Laurence Mound, CSIRO, GPO Box 1700, Canberra, ACT 2601 Tel: (02) 6246 4280. State Departments of Agriculture (Diagnostic Laboratories): in NSW, Insect Enquiry Service, Orange Agricultural Institute, NSW Department of Primary Industries, Forest Road, Orange 2800 Tel: (02) 6391 3800.

- For other pest and disease diagnostic service providers, see listing in *Integrated Pest Management in Ornamentals/Greenhouse Vegetables* Information Guides, NSW Department of Primary Industries Bookshop Tel: (02) 6391 3458 or 1800 028 374.

Help with control options:

NSW Department of Primary Industries Entomologists, Plant Pathologists and Extension specialists, see http://www.agric.nsw.gov.au/reader/hort.

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