National Diagnostic Protocol

Echinothrips americanus

(Poinsettia thrips)

NDP 4 V3

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- are a verified information resource for plant health diagnosticians
- are consistent with ISPM No. 27 – Diagnostic Protocols for Regulated Pests
- provide a nationally consistent approach to the identification of plant pests enabling transparency when comparing diagnostic results between laboratories; and,
- are endorsed by regulatory jurisdictions for use (either within their own facilities or when commissioning from others) in a pest incursion.

Where an International Plant Protection Convention (IPPC) diagnostic protocol exists it should be used in preference to NDPs, unless it is shown that the NDP has improved procedures for Australian conditions. NDPs may contain additional information to aid diagnosis. IPPC protocols are available on the IPPC website:

https://www.ippc.int/core-activities/standards-setting/ispms

Process

NDPs are facilitated and endorsed by the Subcommittee on Plant Health Diagnostics (SPHD). SPHD reports to Plant Health Committee and is Australia's peak technical and policy forum for plant health diagnostics.

NDPs are developed and endorsed according to Reference Standards developed and maintained by SPHD. Current Reference Standards are available at https://www.plantbiosecuritydiagnostics.net.au/work/subcommittee-on-plant-health-diagnostics/

NDPs are living documents. They are updated every 5 years or before this time if required (i.e. when new techniques become available).

Document status

This version of the National Diagnostic Protocol (NDP) for *Echinothrips americanus* is current as at the date contained in the version control box below.

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Further information

Inquiries regarding technical matters relating to this project should be sent to: sphd@agriculture.gov.au

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1 INTRODUCTION

The poinsettia thrips, *Echinothrips americanus* Morgan, is a member of a small genus of *Thripidae*. Only seven species are described in this genus, each appearing to have evolved from a thrips host-plant relationship where the hosts are abundant in its habitat (Mound and Marullo, 1996).

Adults of this thrips have two pairs of slender wings that bear marginal fringes of long cilia. In contrast to most members of this family, the setae on the longitudinal veins on the front pair of wings are unusually long and prominent. The body is dark brown but, in contrast to the common greenhouse thrips that also has the head with reticulate sculpture, the internal pigment of the body is bright red, and the forewings have transverse light and dark coloured bands.

In its native range, *Echinothrips americanus* is particularly associated with impatiens plants, but in greenhouses it breeds readily on plant species from a wide range of families. It is considered a pest on poinsettia (*Euphorbia pulcherrima*) as well as various Araceae such as *Diffenbachia* and *Syngonium* species that are grown for their ornamental foliage. It is reported as a pest of capsicum crops grown in greenhouses and establishes considerable populations on common glasshouse weeds such as *Cardamine hirsuta*. See Appendix 8.1 for a list of genera of plants of which *Echinothrips americanus* has been recorded.

Despite usually being bisexual, this thrips is reported to breed parthenogenetically, with virgin females having been reported to produce both sexes (Oettingen & Beshear, 1994).

Although this thrips is not known to vector any plant viruses, feeding activity by larvae and adults results in small chlorotic areas on leaves with some shrivelling of leaves. Moreover, soiling of leaves occurs with small black faecal droplets, and these are similar to those associated with the greenhouse thrips, *Heliothrips haemorrhoidalis*. Although not at all closely related, these two species appear to share the habit of feeding primarily on older leaves, not on young, rapidly growing tissues.

2 TAXONOMIC INFORMATION

Echinothrips americanus Morgan, 1913

Synonym: *Dictyothrips floridensis* Watson, 1919

Class: Insecta

Order: Thysanoptera

Family: Thripidae

Subfamily: Thripinae

Genus: *Echinothrips*

Species: *Echinothrips americanus*

Only seven species are described in the genus *Echinothrips* and of these, only *E. americanus* has become widespread.

E. asperatus and *E. pinnatus* are each based on a single individual taken in leaf litter in southern Brazil; *E. subflavus* is specific to Tsuga needles (Pinaceae) in eastern U.S.A; *E. selaginellae* is known only from *Selaginella eurynota* (Lycopsida); *E. caribbeanus* is evidently polyphagous, with specimens collected from the leaves of Cissampelos, Cleome and Erythrina; and *E. mexicanus* is also probably polyphagous, but lacks good host records (Stannard, 1968, Mound & Marullo, 1996).

3 DETECTION

This species is likely to be detected only by direct observation of the black adults (Fig. 1 & 2), because damage to the leaves of plants is sometimes minimal. Feeding damage can result in small chlorotic areas, but these can be very similar to the damage caused by an attack of leaf-feeding mites.

This thrips may be found feeding on both the upper and lower surfaces of leaves, indeed on any green tissues, and on some soft leaved plants feeding may result in leaf distortion. The species is not usually associated with flowers or very young leaves.

The larvae produce droplets of dark faecal material, thus soiling the leaves, but this damage is similar to that produced by the larvae of the common greenhouse thrips, *Heliothrips haemorrhoidalis* (Oetting & Beshear, 1994).

Detection is therefore dependent on careful visual inspection, preferably supplemented by use of a hand lens or head-mounted magnifier. The immatures are sluggish in their movements, and the two larval stages are followed by two pupal stages. All of these are pale yellow to orange in colour, with faint brown areas (Fig. 2), but they are not readily seen until an operator has experience in developing a personal 'search image' for them.

As with other thrips species, the quickest method of discovering these insects on a plant is to beat the leaves with a small heavy trowel over a clean plastic surface. Visual inspection of leaves can be successful in discovering the presence of thrips but is more dependent on operator efficiency and is less likely to be effective at relatively low population levels than a simple and careful beating method.

The range of plant species on which this thrips may potentially be found is large and not possible to predict. It appears to be particularly associated with species of Araceae that are cultivated in the domestic environment for their attractive leaves (Collins, 1998). However, it also develops populations on many other plants, including Capsicum crops and various weeds (Vierbergen, 1998), and has now been recorded from members of almost 30 different plant families (see Appendix 8.1).

Figure 1. *Echinothrips americanus* adult; (photographs L: NVWA, Netherlands, R Babu Panthi, University of Florida, http://entnemdept.ufl.edu/creatures/ORN/THRIPS/Echinothrips_americanus.html

Figure 2. *Echinothrips americanus* adults and pupa (pale specimen) (Photograph http://oregonstate.edu/dept/nurspest/poinsettia_thrips.htm.)

Figure 3. Adult greenhouse thrips (*Heliothrips haemorrhoidalis*) (©2010 Pia Scanlon)

4 IDENTIFICATION

4.1 Morphological identification.

Adults of *Echinothrips* can be recognized and distinguished from other thrips by their appearance and structure. With experience and a hand lens, they can be recognized from their general appearance, including the dark brown body with red internal pigment, the slender antennae with at least two segments largely yellow (i.e. not dark brown), the unusually slender forewings that have transverse light and dark bands and bear conspicuously long setae, and the bicoloured legs with brown femora and extensively yellow tibiae (Figs. 1, 4).

These characters contrast with those of the greenhouse thrips, *Heliothrips haemorrhoidalis*, the only species in Australia with which *Echinothrips* might be confused. That species also has the head and pronotum reticulate, but has no red internal pigment, yellow legs, and paler forewings (Figs. 3, 5).

However, as with all Thysanoptera, for precise identification at species level it is essential to prepare specimens onto microscope slides (Appendix 8.2), and to examine these with a compound (preferably phase-contrast) microscope. Slide-mounted voucher specimens should be kept for future reference.

Figure 4. *Echinothrips americanus* (Photograph L Mound)

Figure 5. *Heliothrips haemorrhoidalis* (Photograph L. Mound)

4.1.1 Adults

Members of the genus *Echinothrips* can be established unequivocally by the possession of the first three of the following character states; the fourth occurs in six of the species but not in the one that lives on *Selaginella*: the fifth character state also occurs in a few unrelated species of Thripidae.

1. Head and pronotum conspicuously reticulate (Fig. 6)
2. Mesothoracic internal furca with a prominent median spinula (Fig. 7)
3. Forewing costal and first longitudinal veins both with continuous series of setae that are longer than the wing width and have capitate apices, but second longitudinal vein with no setae (Figs 8, 9)
4. Pronotum posterior margin with two pairs of setae longer than second antennal segment (Fig. 6)
5. Males have an array of more than 50 small circular glandular areas on the abdominal sternites (Fig. 10)

An identification key to the seven known species of *Echinothrips* is available in Mound & Marrulo (1996). Four of these seven species are highly distinctive, but are considered not likely to enter into quarantine considerations:

Echinothrips subflavus Hood can be distinguished from the other members of the genus by its yellow body colour, because the other six species are all brown. This species lives on the needles of Tsugain eastern North America.

Echinothrips asperatus Hood and ***E. pinnatus*** Hood are both known only from single female specimens collected in southern Brazil. These differ from other all other members of the genus in having distinctively broad, fringed apices to the major setae on the head, pronotum and forewings.

Echinothrips selaginellae Mound is known only from Costa Rica, living on one species of *Selaginella*, and is distinguished by the acutely pointed major setae on the forewing, and the lack of long setae on the pronotum.

The other three species in the genus are all polyphagous with extensive distributions in the Americas. The character states in the published literature on which these three have been distinguished may not be entirely reliable, because of variation that occurs within and between populations in such widely distributed species. This variation has never been examined thoroughly in these three *Echinothrips* species and needs to be based on large samples throughout the range of each of them. It is possible that an irregular cline may exist and that the named forms are merely variants along this cline.

1. ***Echinothrips americanus*** is distinguished from *E. caribbeanus* Hood and *E. mexicanus* Moulton by the presence of sculpture lines within most of the reticles on the head and pronotum (Fig. 6). In contrast, markings within the sculptured reticles are considered to be completely absent in the latter two species. However, the extent of these marking varies within available populations of *E. americanus*, such that some individuals within a population have many fewer such markings than other individuals.
2. ***Echinothrips americanus*** has distinctive long microtrichia on the lines of sculpture on the lateral areas of the abdominal tergites (Fig. 11). Microtrichia like these are absent from the tergites of *E. mexicanus*, but they are present in *E. caribbeanus* although in smaller numbers than in *E. americanus*.
3. ***Echinothrips americanus*** has a pair of setae on the second antennal segment of which the apices are slightly expanded. In contrast, these setae have acute apices in the other

two species. This difference is, however, usually too weak and too subjective for critical distinction between these species except where it is strongly developed.

Figure 6. *Echinothrips americanus* head and prothorax (Photograph L. Mound)

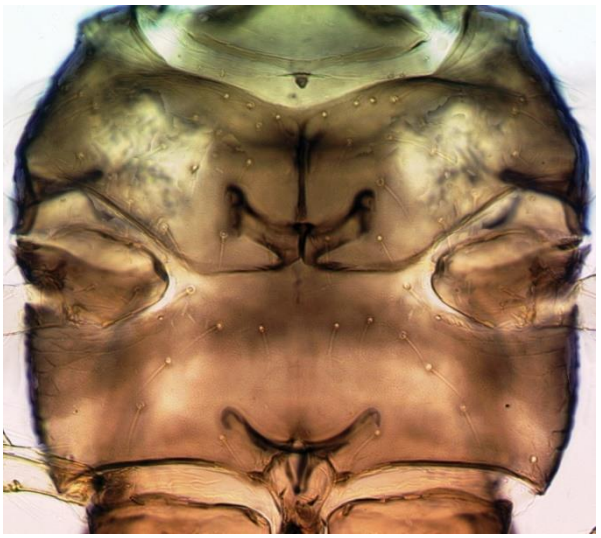

Figure 7. *Echinothrips americanus* meso- and meta-thoracic furcae (Photograph L. Mound)

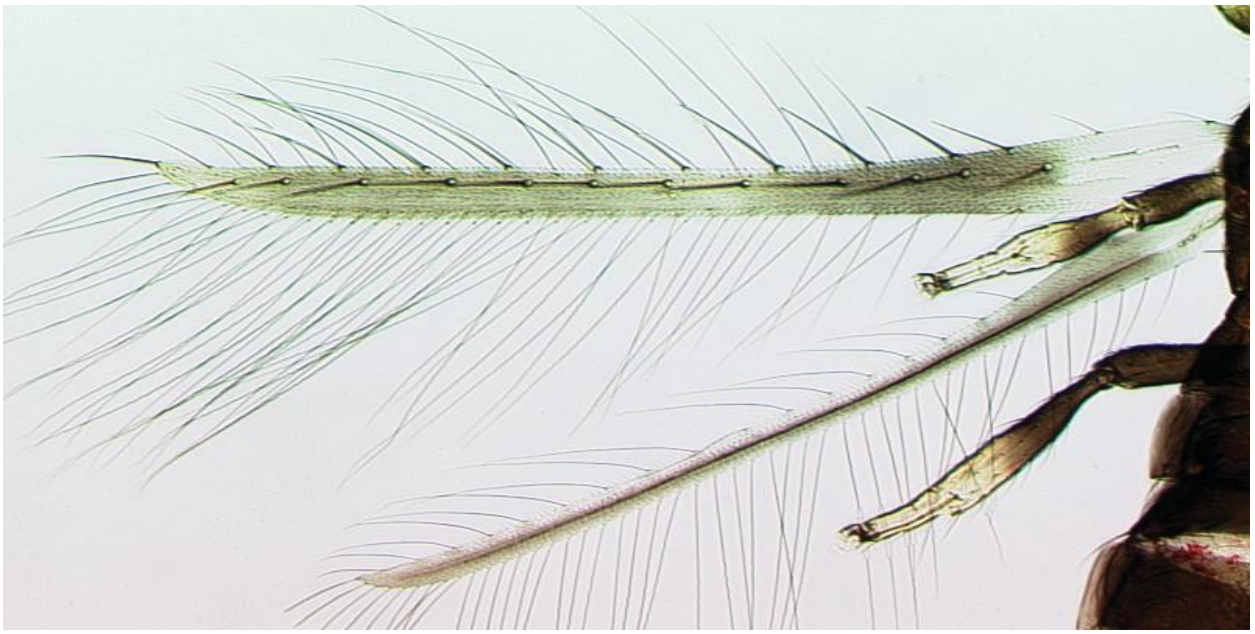

Figure 8. *Echinothrips americanus* wing (Photograph L. Mound)

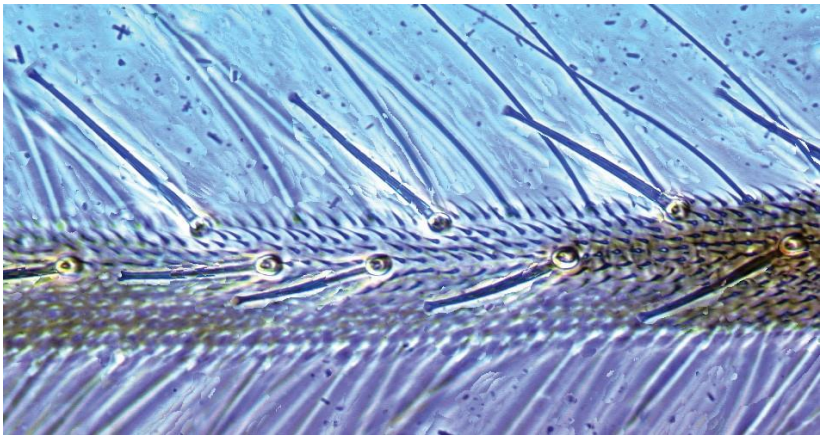

Figure 9. *Echinothrips americanus* wing setae (Photograph L. Mound)

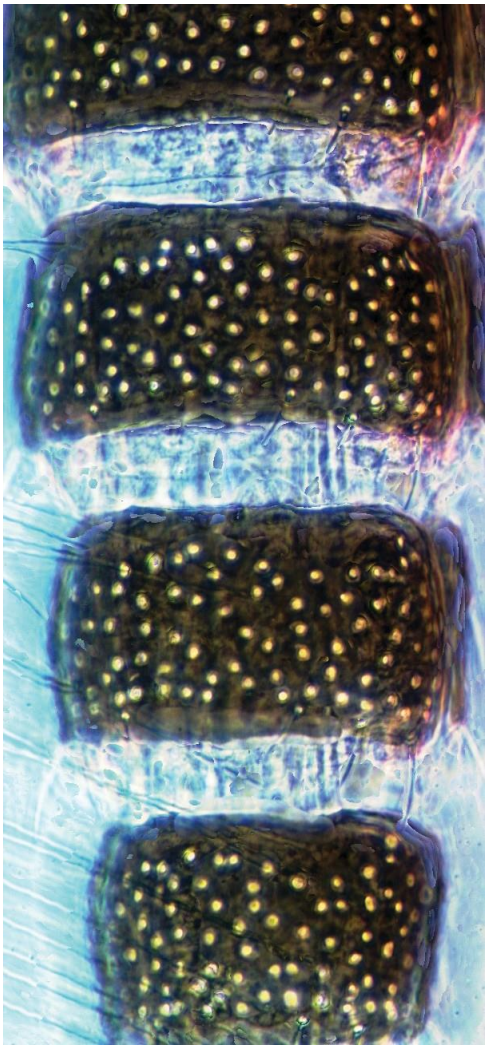

Figure 10. *Echinothrips americanus*: male sternites V–VIII (Photograph L. Mound)

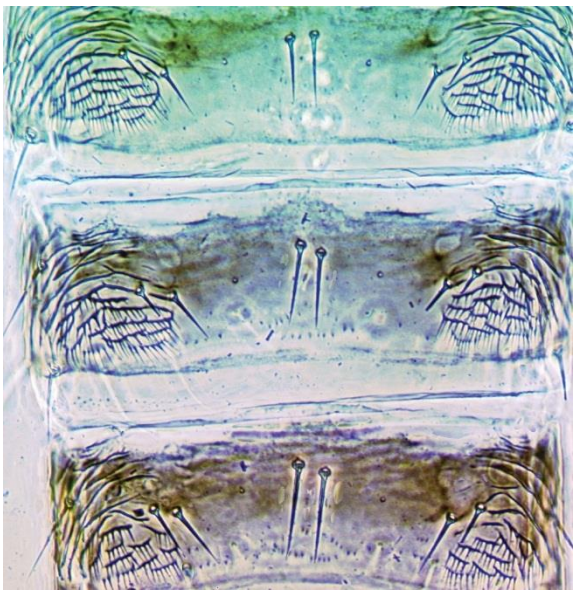

Figure 11. *Echinothrips americanus*: male tergites IV–VI (Photograph L. Mound)

4.1.2 Larvae

The immature stages are not known for six of the species of *Echinothrips*, but the larvae of *E. americanus* are readily distinguished from those of other species of Thripidae by the following combination of character states.

1. Colour largely yellow with red eyes (Fig. 12)
2. Dorsal surface with no obvious sculpture (Fig. 13)
3. Abdominal tergites each with three pairs of long, weakly fringed setae (Fig. 13)
4. Head with three pairs of long, weakly fringed setae (Fig. 12)

Figure 12. *Echinothrips americanus* larva (Photograph L. Mound)

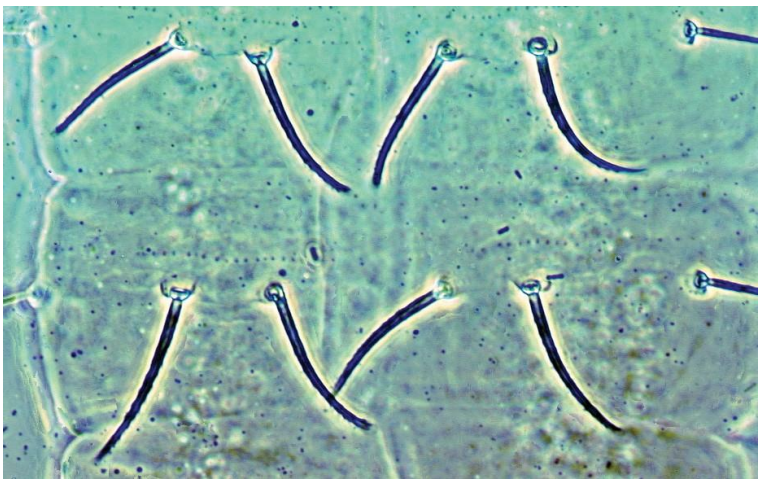

Figure 13. *Echinothrips americanus* larval setae (Photograph L. Mound.)

4.2 Molecular identification

Brunner *et al*. (2002) published a PCR-RFLP test for *Echinothrips americanus* in conjunction with mitochondrial COI sequencing. This is available on open access: https://onlinelibrary.wiley.com/doi/full/10.1046/j.1461-9563.2002.00132.x.

PCR-RFLP produces only a yes-no result based on visual result on gel, but potentially a result can be obtained within a day.

If the results indicate the thrips are not *Echinothrips americanus,* sequencing would be required for identification.

COI barcoding has been used to identify *Echinothrips americanus*. Sequences are available on BOLD, with 23 published public-data barcodes of specimens from 5 countries (when accessed 16 Dec 2019).

This protocol will be updated with additional information on molecular identification in the next review.

5 CONTACTS FOR FURTHER INFORMATION

The only fully comprehensive collection of the known species of *Echinothrips* belongs to the United States Museum of Natural History, Washington, whose collections of Thysanoptera are in the care of the United States Department of Agriculture, Beltsville, Maryland.

The Natural History Museum, London, and the Senckenberg Museum, Frankfurt also holds collections of several species in this genus.

The pest species itself is well known to workers in several countries, including USA (Florida, Georgia, California), Australia (Canberra), and in Europe, England (York) and Netherlands (Wageningen).

Contact addresses for Thysanoptera collections and specialists:

1. United States National Museum of Natural History, PO Box 37012, Smithsonian Institute, Washington D.C., 20013–7012 U.S.A.
2. The Natural History Museum, Cromwell Road, London SW7 5BD, England.
3. Senckenberg Forschungsinstitut und Naturmuseum, Senckenberganlage 25, 60325 Frankfurt, Germany.
4. Dr Mark Hoddle, Department of Entomology, University of California, Riverside, CA 92521, U.S.A.
5. Dr Stan Diffie, Department of Entomology, University of Georgia, P.O. Box 748, Tifton, GA 31793 U.S.A.
6. Dr Dom Collins, Pest and Disease Identification Team, Central Science Laboratory, Sand Hutton, York YO41 1LZ, England.
7. G. Vierbergen, Plant Protection Service, Section of Entomology, P.O. Box 9102, 6700 HC Wageningen, The Netherlands
8. Dr Laurence Mound, CSIRO Entomology, GPO Box 1700, Canberra, ACT 2601.

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7 REFERENCES

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Collins, D.W. 1998. Recent interceptions of *Echinothrips americanus* Morgan (Thysanoptera, Thripidae) imported into England. Entomologist's Monthly Magazine 134: 1–4.

Mound, L.A. & Marullo, R. 1996. The Thrips of Central and South America: An Introduction. Memoirs on Entomology, International 6: 1–488.

Oetting, R.D. & Beshear, R.J. 1994. Biology of the greenhouse pest *Echinothrips americanus* Morgan (Thysanoptera: Thripidae). Zoology (Journal of Pure and Applied Zoology) 4: 307–315.

Vierbergen, G. 1998. *Echinothrips americanus* Morgan, a new thrips in Dutch greenhouses (Thysanoptera: Thripidae). Proceedings of the section Experimental and Applied Entomology of the Netherlands Entomological Society (N.E.V.) 9: 155–160.

8 APPENDICES

8.1 Genera of plants from which *Echinothrips americanus* has been recorded

Agavaceae	*Cordyline*
Apiaceae	*Arracacia*
Araceae	*Anthurium* *Cryptocoryne* *Dieffenbachia* *Homalomena* *Philodendron* *Spathiphyllum* *Syngonium*
Asteraceae	*Dendranthema* *Polymnia*
Balsaminaceae	*Impatiens*
Betulaceae	*Betula*
Brassicaceae	*Cardamine*
Euphorbiaceae	*Euphorbia* *Acalypha*
Fabaceae	*Cassia* *Desmodium* *Mimosa* *Phaseolus*
Liliaceae	*Asparagus* *Veratrum*
Magnoliaceae	*Magnolia*
Malvaceae	*Hibiscus*
Moraceae	*Ficus*
Myricaceae	*Myrica*
Myrtaceae	*Psidium*
Onagraceae	*Ludwigia*
Orchidaceae	*Bletilla*
Oxalidaceae	*Oxalis*
Passifloraceae	*Passiflora*
Poaceae	*Bambusa* *Hordeum*
Pontederiaceae	*Eichornia*
Primulaceae	*Lysimachia*
Rosaceae	*Prunus* *Rubus*
Rubiaceae	*Coffea*
Solanaceae	*Capsicum*
Urticaceae	*Pilea*
Vitaceae	*Cissus*

8.2 Techniques for preparing microscopic slides of thrips

There are two approaches to this procedure, one is quick and uses a water-soluble mountant that is not permanent; the other requires more time and practice but produces slides that remain useful for many years. Similar tools are used for both methods.

Slide preparation tools

Thrips specimens can be manipulated with fine micro-pins, mounted in sealing wax on match sticks. Using a pair of such pins, one should be straight but the other should have the apex bent. A simple lifting tool to move specimens from one dish to another can be made from a loop of fine wire. The most appropriate dishes to use are 'excavated blocks' — glass blocks 15mm high and 40mm square with a median excavation of about 5 mL volume, and with a glass lid to prevent evaporation.

Rapid slide preparations

The use of a water-soluble mountant is quick and thus relatively inexpensive. However, the most effective water soluble mountant, Hoyers Medium, cannot be purchased commercially, and must be prepared from ingredients. An alternative is CMC-10, a high viscosity colourless mountant (commercially available from Masters Co. Inc. 890 Lively Blvd. Wood Dale, IL 60191, (630) 238–9292, https://clombardi5.wixsite.com/mysite/specialty-products)

Although slides prepared in such media are not 'permanent', they may remain useable for several years. This method is recommended for all routine identification work and is particularly appropriate for larvae and for small pale adults. It should be noted that adult *Echinothrips* are quite dark, and Hoyer may not achieve the required transparency.

1. Remove the specimens from any collecting fluid and wash in 60% ethanol.
2. Place a drop of mountant onto a cover slip (13mm circle, No. 1). Place a thrips into this drop, ventral side uppermost, and gently lower a slide onto the drop. Invert the slide as soon as the mountant has spread sufficiently.
3. Place immediately into an oven, or onto a hot-plate, at about 50°C. Leave for several hours before attempting to study. NB it is important to heat newly prepared slides, as specimens often collapse initially but then recover slowly when heated.
4. Leave in an oven for about 3 weeks to dry the mountant, then ring with nail varnish, and label appropriately.

Preparation of a water-soluble mounting medium

Hoyer's Medium is prepared from a mixture of:

1. Gum Arabic – 30 grams (preferably crude lumps, not powdered)
2. Chloral Hydrate – 200 grams (**NB use with care – poisonous**)
3. Glycerol – 20 cc
4. Distilled Water – 50 cc

Constituents 1, 2 and 3 are first dissolved in the 50cc of water, stirring and warming continuously – this process is very slow and may take as long as 24 hours. The solution is then filtered through fine muslin cloth to remove any detritus introduced with the natural gum. The resultant mountant should be clear and pale yellow.

NB – Commercial supplies of Gum Arabic from traditional laboratory suppliers are usually in a powdered form, but this powder is not entirely satisfactory. A good mountant is best made from pale coloured, crude lumps of gum, and non-entomological suppliers of suitable material can be found on the internet.

Permanent slide preparations

The objective is to prepare thrips on a slide with its shape and colour retained as close as possible to the natural, living state, but with the body cleared so that surface detail is visible. Removal of body contents through immersion in very weak hydroxide solution is effective and causes least damage to the body colour.

1. Place up to 20 thrips into clean water for an hour in an excavated block; it is best if the specimens float with their wings on the surface.
2. Add to the water an equal volume of 5% NaOH solution, and leave overnight in this weak solution. (Black coloured thrips species may be left for 2 or more days.)
3. Transfer the specimens from NaOH solution to water for an hour, using a needle or wire loop, then transfer them to 60% ethanol for 12 or more hours. Spread the legs and antennae to display them clearly.
4. Specimens must be progressively dehydrated before slide mounting. Transfer them into 70% ethanol for 1 hour; then into 80% ethanol for 20 minutes; then into 95% ethanol for 10 minutes; then into 100% ethanol for 5 minutes. Wash finally in 100% ethanol before transferring into clove oil, and leave the specimens to clear for at least 30 minutes before mounting. Clearing can be improved by massaging each specimen gently with the back of a bent needle.
5. Prepare a small mounting block by fixing to the centre of a microscope slide a 2mm deep layer of 1 inch square white card. Mark the centre of this with crossed lines, and then cover it with clear plastic tape to provide a clean, shiny surface.
6. Place a clean 13 mm diameter cover slip onto the mounting block; put a drop of Canada Balsam onto the centre of the cover slip and into this place one thrips specimen ventral side uppermost. Spread the legs and wings, and straighten the antennae.
7. Invert a clean microscope slide and lower it firmly but gently onto the specimen in balsam on the cover slip. As soon as the surfaces touch, re-invert the slide with the coverslip adhering; this technique usually avoids the inadvertent introduction of bubbles which ruin so many students' slides. (Sometimes it helps to place a small drop of balsam in the centre of the slide before touching the balsam of the cover slip.)
8. Place the slide onto a hot-plate at once, at about 50°C, to drive off the xylene as quickly as possible. Then dry the slides until they are hard in an oven at about 45°C for several weeks.
9. An insect specimen is of limited value if it is not labelled with its original data. With the head of the thrips directed toward you, the right-hand label should indicate the host plant, the country (in capital letters) and the collecting locality and date, with collector's name (and code number). The left-hand label should indicate the sex, morph and genus and species names with author.

Specimens that have been correctly mounted and labelled constitute an important reference resource for future studies. An appropriate storage system for such slides therefore needs to be devised. Under most circumstances, the most cost-effective system uses standard plastic slide boxes, each holding up to 100 slides. Standing on edge with appropriate labels down the side, these can be housed on shelves like books, and thus give ready access to their voucher slide contents.

9 DIAGNOSTIC PROCEDURES TO SUPPORT SURVEILLANCE

9.1 Introduction

This appendix is written to outline a few essential steps in thrips collection to support surveillance and diagnostic work. The aim is to successfully sample the suspect thrips, and to store and package the sampled materials appropriately so that these arrive at the testing laboratory in adequately good condition for the purpose of diagnosis.

9.2 Collecting thrips samples

Two of the most relevant thrips collecting methods are elaborated here –A) direct hand collection using the beating technique, and B) collecting the plant materials directly. Where required, both approaches can be carried out together to ensure the targeted thrips are found.

A more comprehensive guide of collecting and preparing thrips for study is available online on Thripswiki for further reference: https://thrips.info/wiki/Collecting_and_preparing_thrips_for_study (Thrips Wiki 2013, accessed December 2019).

A) Direct hand collection using the beating technique.

Direct hand collection using a beating tray is appropriate for collecting thrips from all forms of plant materials, either potted or in the field. This method is particularly effective in cases where thrips are suspected to be present on a particular plant, as it allows the collector to observe which part of the plant the thrips are found, and furthermore ensures actual thrips specimens have been sampled directly from the host plants for diagnostic purposes. If hand collection is not feasible, see method B – collecting and submitting plant materials.

Ideally, choose a sunny morning to early afternoon to attend field sites. Collecting thrips is more challenging when the condition is windy, or wet from dew or rain.

You will need (Fig. 14):

1. A fine paint brush.
2. A white tray. White plastic or melamine serving trays are good options as they are sturdy and easy to hold with one hand.
3. A beating tool. A handheld garden shovel is a good option as it is of good length and weight and can be washed between hosts or sites.
4. Rubber sealed cap microtubes containing ethanol of at least 70%. If molecular work is intended, use at least 80% to absolute ethanol.
5. A pencil and paper labels, for recording collection details.
6. Large zip-lock bags, to hold plant materials if hand collection is not feasible (see method B).
7. A magnifying hand lens (optional).

To collect thrips, place a clean beating tray below the plant material, tap the plant firmly two to three times with the beating tool. Debris and insects will fall onto the tray, from which thrips can be spotted and picked up with the fine brush (tip dampen with ethanol) into the collection tube containing ethanol.

Whenever possible, sample multiple individuals from the same host to obtain a good series of adult specimens. Collection information can be written on a label with a pencil and wedged inside the collection tube, or be submitted separately.

Figure 14. Tools for collecting thrips and demonstration of the beating technique: White collecting tray, fine paint brush, rubber sealed cap microtubes, hand lens, small garden trowel (Images source: Thrips Wiki 2013).

B) Collecting and submitting plant materials.

If direct hand collection is not feasible, plant materials can be sampled and then promptly transferred to the diagnostic laboratory or a facility with dissecting microscope for detailed examination of the presence of thrips. The downside of this method is that the suspect thrips may not be present on the sampled plant parts, so it is useful to submit multiple samples to increase the chances of finding the targeted insects.

For larger plants, selected terminal section containing florets, young and old leaves, especially symptomatic parts (See Section 9.3). Small potted plants can be submitted as whole. It is also important to communicate with the testing laboratory about intention to send in entire or large amount of plant materials.

The plant materials would need to be packaged in a way to prevent live insects from escaping whilst in transit. A method is to place the plant materials in a plastic container, then in a large zip-lock bag.

You will need:

- Zip-lock bags and plastic containers appropriate to the size of the plant materials.
- Pruning shears.

Submitting samples to the testing laboratory.

The collected thrips samples in microtubes, and the plant parts may be packaged based on the recommended packaging methods in the CRC Plant Biosecurity published guide: How to send samples for diagnosis in Australia: Plant disease and insect Identification. CRC Plant Biosecurity (Hall, 2011).

Essential information accompanying the samples submitted for diagnosis should include:

- Location/origin. Give as much information about the origin of the sample as possible (e.g. state, suburb; or, intercepted at location X from plant imported from country Y).
- Host, or the type of materials from which the insects were found.
- Date of collection.
- Reason for submission: whether there is a suspect species to rule out, or if a general diagnostic is required.

9.3 In Field Tests

No in-field rapid molecular diagnostic tests are currently available for the *Echinothrips americanus*.

E. americanus may be detected *via* observation of the adult and immature thrips and infestation characteristics (Fig. 15), however, as with all thrips, further species identification should be performed at a facility with stereo and compound microscopes using specimens mounted on microscopic slides.

Detection of suspect presence of *Echinothrips americanus* by visual inspection:

Affected plants may be **symptomatic**, including small chlorotic areas on the surface of the leaves due to loss of chlorophyll from feeding activities, some shrivelling of leaves, and soiling of leaves with small black faecal droplets; but may also display **no symptoms** at all.

As with many other thrips species, adults of *Echinothrips americanus* may be spotted **with naked eyes** only as speckles of slender black spots on the plant materials, while the larvae are pale yellow.

With hand lens, the following combination of features may be observed from the adult *Echinothrips americanus*:

- Dark brown body with red or orange bands between abdominal segments.
- Slender, dark forewings lay on the back of the body, bearing long hair, with white band at the base of the wings.
- Bicoloured antennal segments, darker at the tips.
- Bicoloured legs with dark brown femora and extensively yellow tibiae.

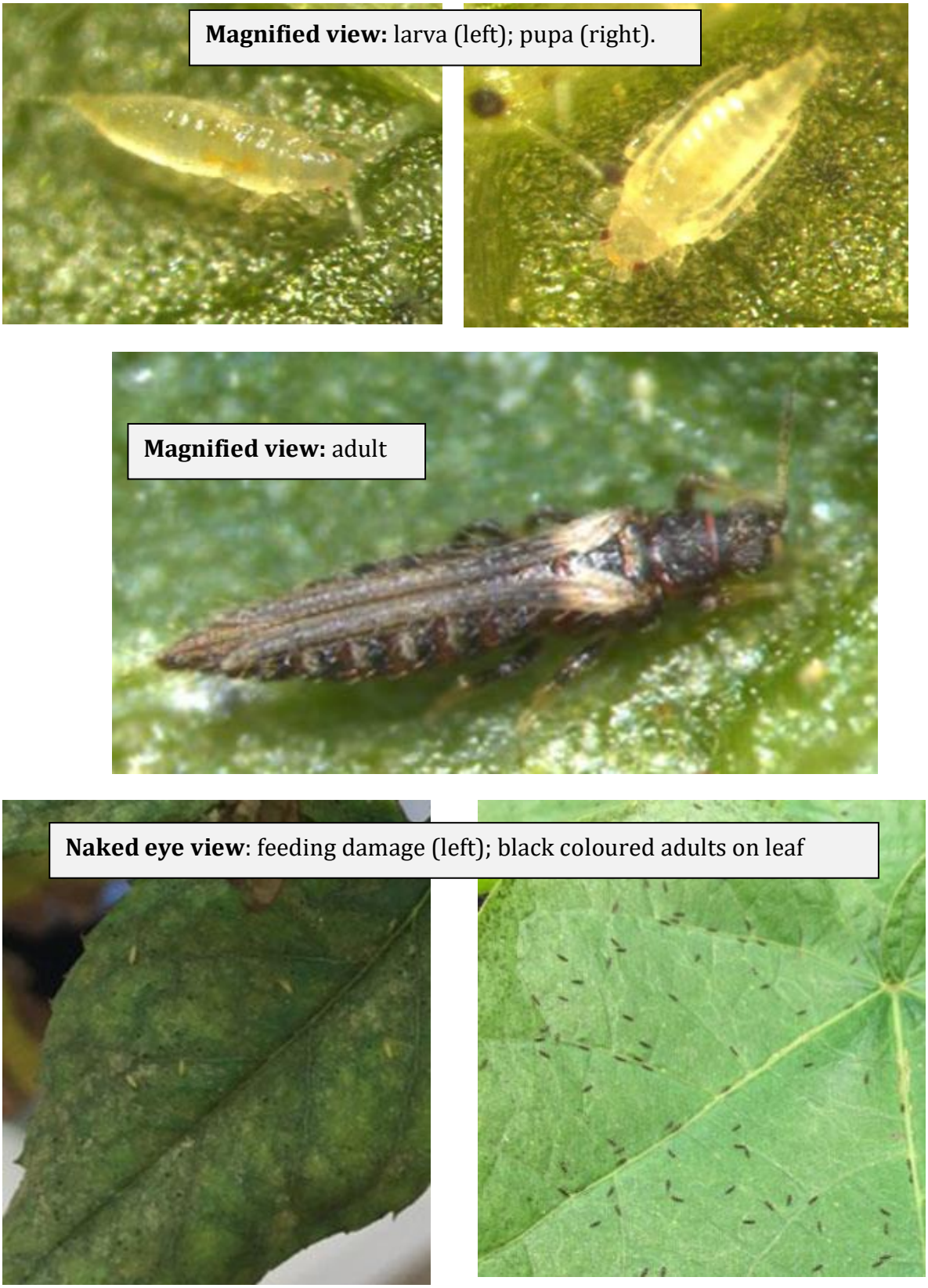

Figure 15. Spotting poinsettia thrips, *Echinothrips americanus*.
(All images sourced from Panthi *et al*. May 2019 EENY-730, UF/IFAS Extension).

9.4 Laboratory Tests

No molecular tests are listed in the current NDP, however links to methods are included.

Morphological identification of this species can be performed by a diagnostician based on the methods outlined in Section 4.

A list of experts and institutions who may be consulted for the confirmatory diagnosis of a suspect positive of this species are listed in Section 5.

9.5 Acknowledgements

This appendix was developed by Li Xin Eow (Agriculture Victoria).

9.6 References

https://edis.ifas.ufl.edu/in1246. Accessed 17.8.2020

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