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Scientific paper – *Artículo científico*

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Abstract

In the present paper the author carries out a list with the Thysanoptera species identified as pests on woody ornamental crops of Galicia, as part of his independent consultancy service, carried out from 1999 to 2020. A total number of 4 different species were identified: *Thrips tabaci*, *Thrips magnus*, *Frankliniella occidentalis* and *Heliothrips haemorrhoidalis*. Considering only crop pests, 3 of them had been referenced for the first time by the author, on previous papers, as pests on woody ornamental crops in Galicia, and one of them as first reference for Spain. The paper includes photographs of all of the identified species carried out by the author.

Key words: *Thrips tabaci*, *Thrips magnus*, *Frankliniella occidentalis* and *Heliothrips haemorrhoidalis*, Galicia, woody ornamental crops.

Resumen

En el presente trabajo el autor relaciona la totalidad de especies de tisanopteros identificadas en cultivos de especies leñosas ornamentales de Galicia, basándose en la información obtenida de su trabajo como consultor entomológico independiente, desde 1999 a 2020. Se identificaron las siguientes especies: *Thrips tabaci*, *Thrips magnus*, *Frankliniella occidentalis* y *Heliothrips haemorrhoidalis*. En condiciones de cultivo, 3 de las mismas fueron referenciadas por el autor, en artículos previos, como nuevas citas para Galicia y 1 de las mismas para España. El artículo incluye fotografías de todas las especies identificadas, realizadas por el autor.

Palabras clave: *Thrips tabaci*, *Thrips magnus*, *Frankliniella occidentalis* and *Heliothrips haemorrhoidalis*, Galicia, cultivos de leñosas ornamentales.

1. Introduction

The list of *tysanoptera* species referenced, up to the present moment, as pests of woody ornamentals in Spain, is not short and specially related with carnation cultivation: *Heliothrips haemorrhoidalis*, *Thrips tabaci*, *Thrips flavus*, *Thrips fuscipennis*, *Thrips magnus*, *Frankliniella occidentalis*, *Hercinothrips femoralis*, *Herconothrips bicinctus*, *Parthenothrips dracaena*, *Frankliniella schultzei*, *Frankliniella tenuicornis*, *Thrips*

dianthi, *Thrips meridionalis*, *Thrips simplex*, *Haplothrips cottei*, *Gynaikothrips ficorum*, *Aeolothrips intermedius*, *Aeolothrips tenuicornis*, *Melanothrips fuscus*, *Odonothrips ignobilis*, *Thrips angusticeps*, *Thrips discolor*, *Thrips meridionalis*, *Haplothrips cottei* & *Haplothrips niger* (Villalva, 1996, De Liñán, 1998; Salinero & Vela, 2004; Lacasa et al., 1988, Andrés, 2016; 2017; Bielza & Andrés, 1991)

The number of species belonging to this order and referenced on woody ornamental crops in Galicia (NW Spain) is significantly shorter and should be matter of future studies: *Thrips tabaci*, *Thrips magnus*, *Heliothrips haemorrhoidalis*, *Frankliniella occidentalis* (Salinero & Vela, 2004; Andrés, 2016, 2017; Bielza & Andrés, 1991).

The identification of the main species of these thrips, on woody ornamental crops, is specially useful for the design of sustainable plant protection programs due to the problem of resistance to insecticides referenced, up to the present moment, on different *Thysanoptera* species –*Frankliniella occidentalis*, *Megalurothrips sjostedti*, *Scirtothrips perseae* and *Thrips tabaci*– (IRAC, 2020; IRAC, 2020 b). Their exact determination is also necessary, at the present moment, due to the increasing quarantine thrips number of species for certain countries of the world.

2. Material & methods

The study was carried out only on woody ornamental production centres of Galicia, intermittently, from 1999 to 2020. The samples were obtained from 10 nurseries belonging to the following Galician provinces: 6 in Pontevedra, 3 in A Coruña and 1 in Lugo. The entomological monitoring of the pests was carried out every 15 or 30 days, sampling periodically in order to identify the *Thysanoptera* species by means of classical entomological determination methods.

The thrips were extracted from the sampled leaves by means of a *Berlesse-Thulgren* funnel. The preparation of the thrips was carried out following the digestion methods described by Palmer *et al.* (1989). The extracted thrips were dipped in alcohol (70%) during 24 hours. After that period the insects were introduced and pinched in a NaOH (10%) solution. Then the thrips were washed in distilled water during 24 hours. The insects were observed on the microscope preparing them with Canadian balsam. Then they were classified using the taxonomical criteria of Berzosa (1989) and Nakahara (1994).

3. Results

LIST OF IDENTIFIED ESPECIES

FAMILY THIRIPIDAE

1. *Frankliniella occidentalis* Pergande

- Hosts observed in Galicia: *Dianthus caryophyllus*, *Dianthus chinensis*.
- Type of crop: soil.
- Province: Pontevedra.

2. *Heliothrips haemorrhoidalis* Bouché

- Hosts observed in Galicia: *Camellia japonica*, *Lepidospermum scoparium*, *Liquidambar sp.*, *Magnolia × soulangiana*, *Rhododendron sp.* and *Photinia × fraserii*.
- Type of crop: container.
- Province: Pontevedra & A Coruña.

3. *Thrips tabaci* Lindeman

- Hosts observed in Galicia: *Dianthus caryophyllus*, *Dianthus chinensis*.
- Type of crop: soil.
- Province: Pontevedra.

4. *Thrips magnus* Moulton

- Hosts observed in Galicia: *Sasa tsuboiana*, *Phyllostachys rubromarginata*, *Phyllostachys aureosulcata*, *Phyllostachys bissetti*, *Phyllostachys humilis*, *Phyllostachys aurea*, *Phyllostachys nigra*, *Phyllostachys atrovaginata*, *Pseudosasa japonica*, *Pleioblastus linearis*, *Pleioblastus variegatus*, *Pleioblastus humilis*, *Pleioblastus pumilus*, *Pleioblastus pigmaeus*, *pleioblastus distichus*.
- Type of crop: soil & container.
- Province: Pontevedra & A Coruña.

4. Discusión

It is important to mention that this paper, as well as the former publication on 2016, are the first references in the world of *Thrips magnus* Moulton as pest of bamboo, up to 2016 this species was not considered a pest, but an inhabitant of *Mimulus* (*Scrophulariaceae*) (Lucidcentral, 2015).

In commercial nursery conditions *Thrips magnus* is a species that is deeply conditioned by

climatic parameters, specially temperature, the periods of activity of the pest are longer on warmer years and the first sight of the larvae takes place earlier in warmer than in cooler campaigns. This is specially of great importance for the chemical control strategy of the pest (Andrés 2016).

The data presented in this paper have certain contrast with those obtained by other authors on other countries with atlantic climate, such as the UK, where the species of *thrips* considered pests to woody ornamental species are the following: *Heliothrips haemorrhoidalis*, *Parthenothrips dracaena*, *Dendrothrips ornatus*, *Frankliniella occidentalis*, *Frankliniella intosa*, *Thrips fuscipennis*, *Thrips tabaci*, *Thrips atratus* and *Thrips nigropilosis* (Alford, 1995).

If we revise international bibliography, the list of *thysanoptera* that are referenced as phytophagous to ornamental plants is relatively long and differs to that which includes only those specifically referenced as pest on woody ornamental crops. If we consider only the latter one, it is important to mention the following species –we have excluded the species identified in Spain that were previously mentioned in this paper–: *Gynaikothrips ficorum*, *Gynaikothrips uzeli*, *Aleurodothrips fasciapennis*, *Hoplendothrips sp.*, *Heterothrips sericatus*, *Caliothrips phaseoli*, *Frankliniella occidentalis*, *Thrips orientalis*, *Thrips palmi*, *Heliothrips haemorrhoidalis*, *Frankliniella australis*, *Heliothrips leucanthemi*, *Frankliniella bispinosa*, *Echinothrips americanus*, *Echinothrips americanus*, *Hercinothrips bicinctus*, *Herconothrips femoralis*, *Microcephalothrips abdominalis*, *Palmiothrips palmarum*, *Parthenothrips dracaenae* and *Thrips palmi* (Soto-Rodríguez *et al.*, 2017; Manosalva *et al.*, 2011; Funderburk *et al.*, 2021; Reynaud, 2010).

Following the information supplied by EPPO *Frankliniella occidentalis* is the only quarantine pest, considered as such in Egypt, Morocco, Tunisia, Paraguay, Uruguay, Bahrain, Jordan, Kazakhstan, Georgia, Russia, Turkey and Ukraine. (EPPO, 2021).

Some of these species are referenced to have populations with resistance to certain groups of insecticides and acaricides. *Frankliniella occidentalis* has been referenced as resistant to carbamates, organophosphates, cyclodiene organochlorines, phenylpyrazoles, pyrethroids, neonicotinoids, spinosyns, avermectins as well

as pyriproxifen. *Thrips tabaci* has referenced populations worldwide, resistant to pyrethroids and organophosphates (IRAC, 2021, 2021 b).

The situation described in this paper is valuable for the design of effective and sustainable plant protection as well as integrated pest management programs.

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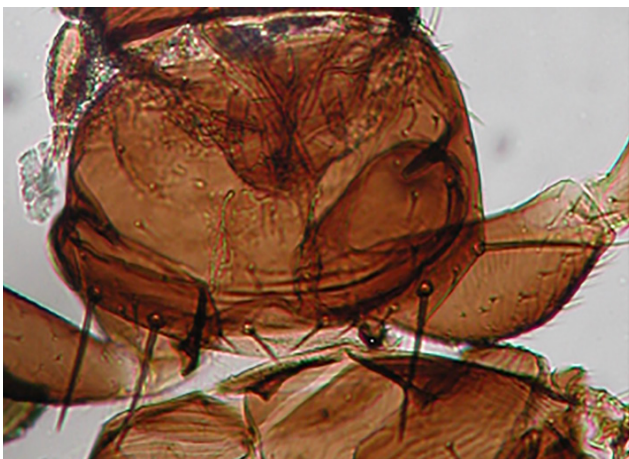
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6. Photographs



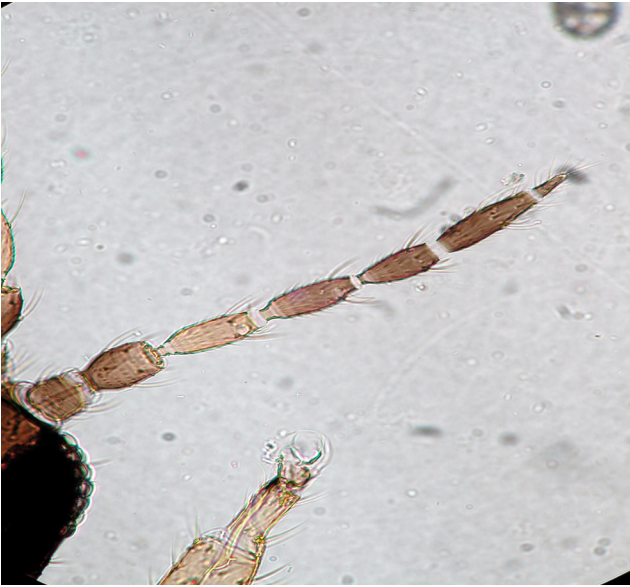
Photograph 1. Pronotum *Thrips magnus* Moulton



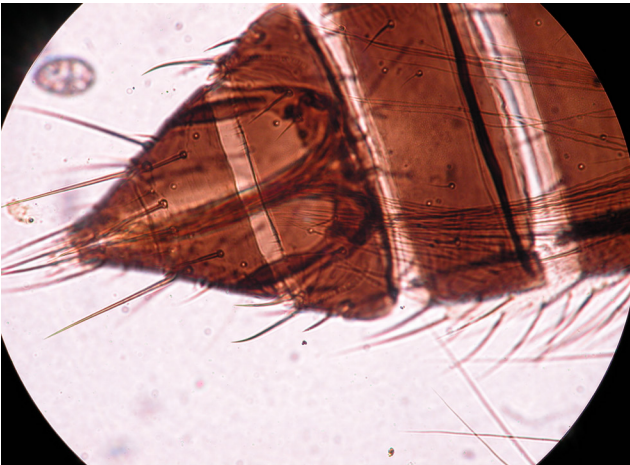
Photograph 2. Female body of *Thrips magnus* Moulton



Photograph 3. Head of *Thrips magnus* Moulton



Photograph 4 . Antenna of *Thrips magnus* Moulton



Photograph 5. Tergite VIII of *Thrips magnus* Moulton



Photograph 6. Wings of *Thrips magnus* Moulton



Photograph 7. Wings of *Thrips magnus* Moulton



Photograph 8. Sternites II - VIII of *Thrips magnus* Moulton



Photograph 9. Stermites II – VIII of *Thrips magnus* Moulton



Photograph 11. Head of *Heliethrips haemorrhoidalis*



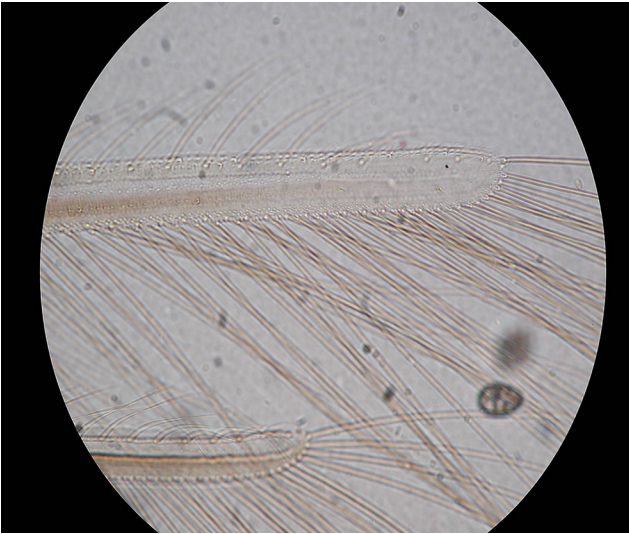
Photograph 12. Antenna of *Heliethrips haemorrhoidalis*



Photograph 10. Head, thorax and abdomen of *Heliethrips haemorrhoidalis*



Photograph 13. Wings of *Heliethrips haemorrhoidalis*



Photograph 14. Hindwing of *Heliethrips haemorrhoidalis*



Photograph 17. Head and antennae of *Frankliniella occidentalis*



Photograph 15. Thorax of *Heliethrips haemorrhoidalis*



Photograph 18. Antenna of *Frankliniella occidentalis*



Photograph 16. Head, thorax and abdomen of *Frankliniella occidentalis*



Photograph 19. Hindwing and Forewing of *Frankliniella occidentalis*



Photograph 20. Hindwing and Forewing of *Frankliniella occidentalis*



Photograph 23. Head, pronotum, mesonotum, metanotum and abdomen of *Thrips tabaci*



Photograph 21. Tergite VIII of *Frankliniella occidentalis*



Photograph 24. Head and antennae of *Thrips tabaci*



Photograph 22. Pronotum of *Frankliniella occidentalis*



Photograph 25. Antennae of *Thrips tabaci*



Photograph 26. Ovipositor of *Thrips tabaci*



Photograph 28. Forewing and Hindwing of *Thrips tabaci*



Photograph 27. Maxillary palps of *Thrips tabaci*