



Spread of the polyphagous pest *Scirtothrips dorsalis* (Thysanoptera: Thripidae) in Brazilian crops

Emanoel C. Alves[✉] · Jeanne S. Marinho-Prado[✉] · Noelly M. O. Silva[✉] ·
Brígida Souza[✉] · Leonardo M. Moriya[✉] · Pedro L. B. T. Piza ·
Élison F. B. Lima[✉]

Received: 20 May 2025 / Accepted: 27 March 2026 / Published online: 1 April 2026
© The Author(s) 2026

Abstract The thrips, *Scirtothrips dorsalis* Hood (Thysanoptera: Thripidae), is native to Asia. Although it is still listed as a quarantine pest in Brazil, it has also been reported in this country. In the present study, we expanded the distribution of this species to southeastern Brazil and provided new records for the northeastern region, where it was initially detected. In addition, we warn about its expansion in the country, comment on the injuries it has caused, and discuss the potential losses to crops. The samples were collected in five states from *Passiflora edulis*, *Capsicum* sp., *Rosa* sp., and *Macadamia integrifolia*. We found that this thrips caused injuries to the leaves and flower buds of rose bushes. The presence of different developmental stages of *S. dorsalis*

on these crops indicates that they are the true hosts and that the populations have the potential to negatively affect the crops.

Keywords Chilli thrips · Cryptic species · *Macadamia integrifolia* · *Rosa* spp. · Yellow tea thrips

Introduction

The thrips *Scirtothrips dorsalis* Hood (Thysanoptera: Thripidae) is a polyphagous pest native to Asia that has been spreading rapidly worldwide (Kumar et al., 2013). Information regarding its host plants reveals a broad spectrum, encompassing 40–72 botanical families, which can span over 225 species (Dickey et al., 2015; Centre for agriculture bioscience international, 2021; Atakan & Pehlivan 2021; EPPO, 2025). The spread of this insect can be facilitated by wind and anthropogenic activities associated with the transportation of infested material, given that thrips eggs are laid within plant tissues and are therefore difficult to detect with the naked eye (Kumar et al., 2013, 2019). In addition to the direct damage resulting from feeding on plant tissue, *S. dorsalis* is a vector of orthotospoviruses to its host plants (Kumar et al., 2019; Mound et al., 2022; Pessoa et al., 2022). This species can adapt to various environmental conditions and, exhibits distinct distribution patterns within the plant during its developmental stages; immatures tend

E. C. Alves (✉) · B. Souza
Programa de Pós-Graduação Em Entomologia,
Departamento de Entomologia, Universidade Federal de
Lavras (UFLA), Lavras, MG, Brazil
e-mail: emanoelcost@hotmail.com

J. S. Marinho-Prado
Empresa Brasileira de Pesquisa Agropecuária, Embrapa
Meio Ambiente, Jaguariúna, SP, Brazil

N. M. O. Silva · É. F. B. Lima
Programa de Pós-Graduação Em Ciências Agrárias,
Universidade Federal Do Piauí, Campus Professora
Cinobelina Elvas, Bom Jesus, PI, Brazil

L. M. Moriya · P. L. B. T. Piza
Queen Nut Indústria E Comércio de Alimentos LTDA,
Estância Macadâmia, Dois Córregos, SP, Brazil

to aggregate in young leaves, while adults are usually dispersed throughout different parts of the plant (López-Lima et al., 2023).

Despite being officially designated as an absent quarantine pest in Brazil (MAPA, 2022; Hilman et al., 2023), *S. dorsalis* has been reported in Brazil. Its first occurrence was documented in 2018 in the northeastern state of Ceará, where it was found infesting ungrafted dwarf cashew (*Anacardium occidentale* L.) seedlings (Dias-Pini et al., 2018). Following the initial report, the species was subsequently discovered in cacao trees (*Theobroma cacao* L.) in Bahia, causing foliar wrinkling, limb curling, and necrosis in the leaves, as well as injuries and rust on the fruit peel (Nakayama & Lindner, 2022).

The present study aimed to document new records of *S. dorsalis* in northeastern and southeastern of Brazil. The records of this species in Brazil have been expanded, and its distribution on other host crops in Brazil has been warned.

Materials and methods

The specimens of thrips were collected from five different states, in different crops of economic importance, covering the Northeast and Southeast regions of Brazil (Table 1).

Adult and immature specimens were collected from different parts of the plants and placed in Eppendorf® 1.5 ml microtubes containing ethyl alcohol (70%), each properly labeled. Fine-point brushes were used for sample collection. The specimens were mounted on permanent slides using Canada

balsam and identified using taxonomic keys (Hoddle & Mound, 2003; Mound & Palmer, 1981; Mound & Stiller, 2011). For immatures individuals, slides were mounted based on Lima et al. (2021) and specimens were identified based on Vierbergen et al. (2010) and Lima et al. (2022). Voucher specimens were deposited in the Natural History Collection of the Federal University of Piauí (UFPI), Amílcar Ferreira Sobra Campus (CAFS), Floriano, Piauí.

A graph was created using the latitude and longitude data of the sampling sites to represent the distribution of *S. dorsalis*. For this, R 4.2.0 (R Core Team, 2022) and the packages "tidyverse," "natural earth," "dev tool," and "rnatulearthhires" were used.

Results

In the rose bushes, adults (Fig. 1) and immatures of *S. dorsalis* were collected from the leaves and flower buds at different developmental stages.

Scirtothrips dorsalis has been recorded in seven Brazilian states in the Northeast and Southeast regions. The first collection was conducted in São Luís, Maranhão, which is associated with *P. edulis*. Although the first official registration was predated, it was identified later on. The most recent collections were performed on rose bushes in Lavras (Minas Gerais), macadamia trees in São Mateus (Espírito Santo) and Dois Córregos (São Paulo), and *Capsicum* sp. in Oeiras (Piauí) (Fig. 2).

Although the first records of the occurrence of *S. dorsalis* in Brazil began with the publications of Dias-Pini et al. (2018) and Nakayama and Lindner

Table 1 Location of sampling sites on different host plants in which thrips collected

State	Municipality	Geographic coordinates		Collection date	Host
		Latitude	Longitude		
Maranhão	São Luís	−2,53073	−44,3068	17.xii.2021	<i>Passiflora edulis</i>
Espírito Santo	São Mateus	−18,7167	−39,8594	22.ii.2021	<i>Macadamia integrifolia</i>
São Paulo	Dois Córregos			22.ii.2021	
		−22,3662	−48,3801	25.ii.2021	
				5.iv.2021	
Minas Gerais	Lavras			1.viii.2021	<i>Rosa</i> sp.
		−21,2457	−44,9998	2.xi.2021	
				10.iii.2022	
Piauí	Oeiras	−7,02042	−42,1317	23.xi.2022	<i>Capsicum</i> sp.

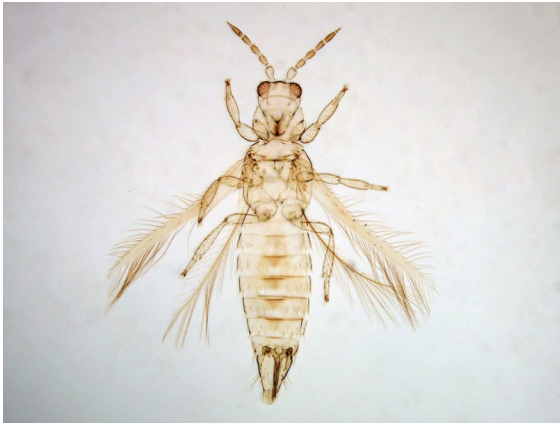


Fig. 1 Overview of female *Scirtothrips dorsalis* (mounted on a slide prepared in Canada balsam); specimen collected in rose bushes

(2022), specimens had already been collected as early as 2012 from *P. edulis* in São Luís (Maranhão). However, this is the first report of such a case in the literature (Fig. 3).

Discussion

The presence of different developmental stages of *S. dorsalis* on rose bushes indicates that this Rosaceae species is a true host for this thrips (Ebratt-Ravelo et al., 2018). In India, *S. dorsalis* is recognized as one of the most important pests affecting rose crops (Onkarappa & Mallik, 1998; Duraimuruga & Jagadish 2004). Eggs of this species have been observed on the leaves and occasionally on the rose petals of plants cultivated in the field and both immature and adult *S. dorsalis* feed on rose petals, were they are protected from insecticide application

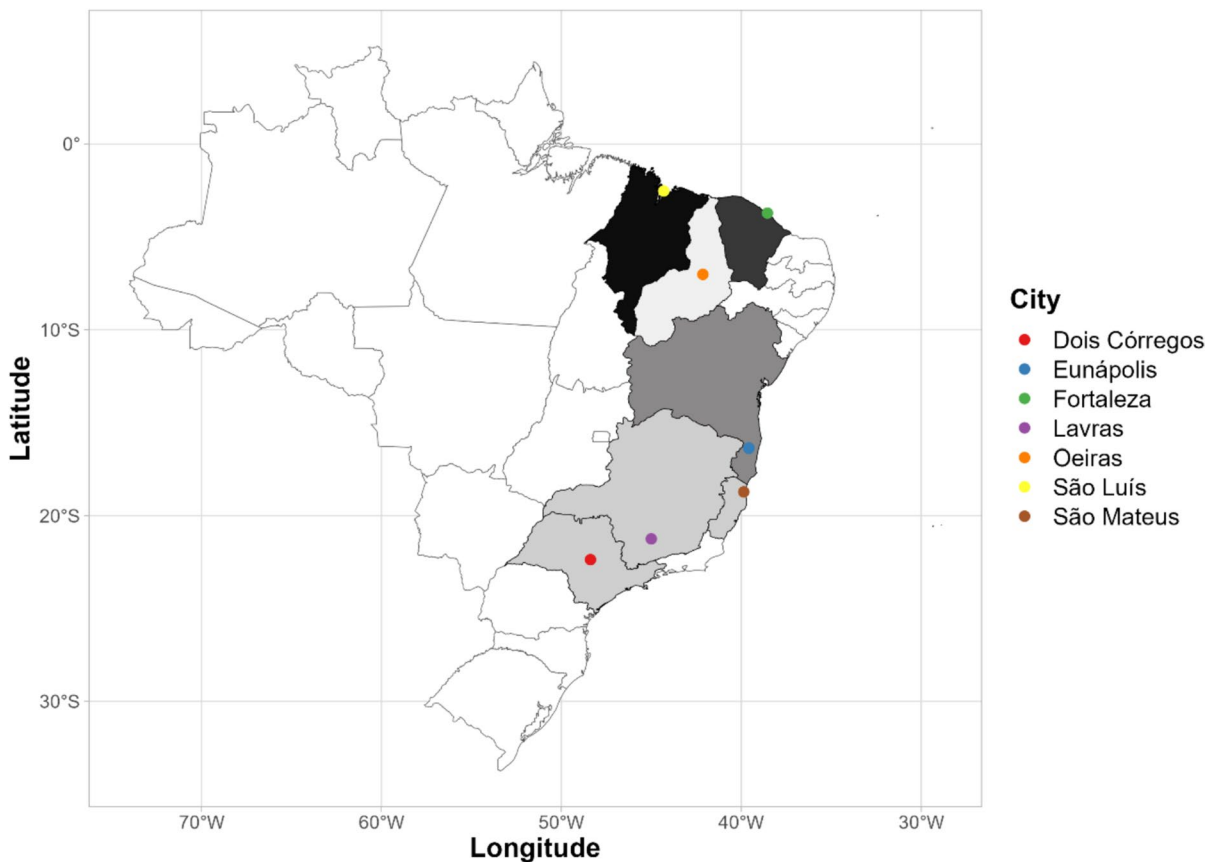


Fig. 2 Distribution of *Scirtothrips dorsalis* in Brazil. The color scale in the shades of the gray gradient indicates the collection period of the species, from the oldest (black) to the most recent (light gray)

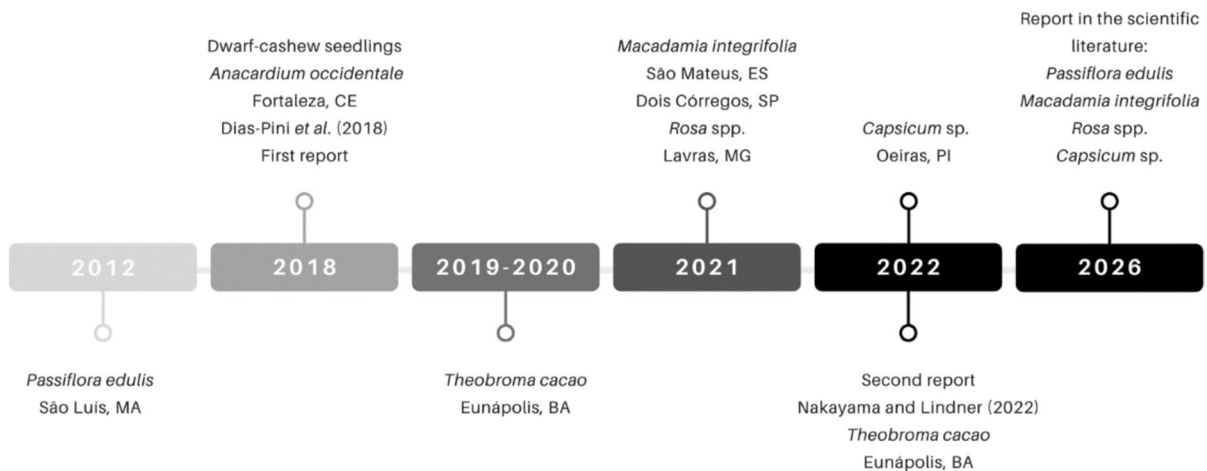


Fig. 3 Timeline of the co-occurrence record of *Scirtothrips dorsalis* in Brazil and respective publications

(Duraimurungan & Jagadish 2011). Mannion et al. (2013) observed higher number of thrips on flower buds, although they were also found on leaves. The findings from these studies led us to hypothesize that oviposition on leaves, nymphs and adults subsequently transfers to the flower buds.

The thrips *S. dorsalis* damages the host plant by extracting contents from the epidermal cells on which it feeds, leading to tissue necrosis and consequently reducing productivity (Kumar et al., 2013). This is particularly significant because roses are sought-after aesthetic products in the consumer market. In addition to the rose bush, Kumar and Rachana (2021) found eggs, immature, and adults of *S. dorsalis* in parsley [*Petroselinum crispum* (Miller) Nyman] leaves.

Despite the occurrence of *S. dorsalis* being reported in Mexico by Ortiz et al. (2020) in 2019, it did not have an official phytosanitary status until 2023 (López-Lima et al., 2023). In 2024, it was cataloged as a pest under phytosanitary surveillance by the General Directorate of Plant Health Directorate of National Phytosanitary Reference Center in a technical file with bioecological information and monitoring and management recommendations (DGSV-DCNRF, 2024); however, its distribution remains restricted (EPPO, 2025). López-Lima et al. (2023) collected *S. dorsalis* from different host plants in Mexico, including *Persea americana* Miller, *Rubus* sp., *Vaccinium* sp., *Mangifera indica* L., *Citrus latifolia* Tanaka, *Pyrus communis* L., and *Annona muricata*

L. They found variations in feeding injuries according to the host species, phenological stage, and type of injured tissue.

Ebratt-Ravelo et al., (2018) recorded the occurrence of *S. dorsalis* on the leaves and fruits of 13 species of economically important plants distributed across 12 genera in Colombia. These included cotton, orange, pepper, chili pepper, mango, rose, garden, and backyard plants along with exotic and native weed species. Ebratt et al., (2018) noted the preference of *S. dorsalis* for feeding on young leaves, flower buds, and bolls. Likewise, the pest exhibits a preference for young leaves and terminal blueberry shoots, with injuries characterized by changes in the color of the plant tissue. This alteration results in a silvery or brownish appearance, allowing for the inference of the presence of immatures and adults in plants (Atakan & Pehlivan, 2021).

In macadamia plantations in Australia, *S. dorsalis* is commonly referred to as a flower thrips, although it can also attack leaves (Bright, 2021, 2022). A study in this country found that feeding on shoots causes stunting and deformation of young leaves, with consequent darkening and shedding of shoots. This affects the production of the year following infestation, resulting in fewer branches producing flowers (Vitelli, 2014). Notably, in the present study, the species was not collected from inflorescences of Brazilian macadamia, but only from leaves, mainly shoots.

In Brazil, Ferrari et al., (2021) assessed the population incidence of thrips in macadamia plants

of the HAES 333 and IAC 4-12B varieties and revealed a higher attack of these insects on racemes (inflorescences), with a peak occurring from July to September. However, that species of thrips usually belongs to the genus *Frankliniella*. Thus, the period of infestation by *S. dorsalis* reported in the present study (February to April) does not coincide with the flowering period of the crop (July to September) commonly observed in field crops, during which *Frankliniella* species are usually abundant. Therefore, the unusually high incidence of thrips at a time when infestations are not typically observed in macadamia orchards drew the attention of producers, raising suspicions of the presence of a different species; this, in turn, prompted the collection and identification of *S. dorsalis*. This occurrence was reported to the Department of Health and Inputs, Secretariat of Agricultural Defense, Ministry of Agriculture and Livestock (DSV/SDA/MAPA) in October 2021.

There are no record of *S. dorsalis* in commercial ornamental plant areas in Brazil. However, this species can potentially reach pest status and cause economic losses in these areas. In a report notifying the Ministry of Agriculture, Livestock and Supply (MAPA) about the presence of these thrips in Brazil, Dias-Pini et al., (2018) underscored the potential impact of this species on the national fruit-growing industry. The authors also included urgent recommendations for studies aimed at establishing control measures to mitigate damage and prevent pest dispersion throughout Brazil. Pessoa et al., (2022) reviewed information on *S. dorsalis* and its control. This review also offers insights into the developmental aspects of thrips under typical thermal conditions in Dois Córregos (São Paulo). According to this review, up to 17 complete generations of *S. dorsalis* can occur per year on macadamia plants under the evaluated conditions.

In this regard, this thrips has been present in Brazil for more than 10 years, and it is therefore impossible to know its entry date into this country. Therefore, it is crucial to emphasize the important role of taxonomists in identifying newly introduced species in the country. Their work serves as a fundamental pillar for decision-making by competent bodies and the implementation of integrated pest management strategies.

With the expansion of the distribution of *S. dorsalis* to several states in southeastern and north-eastern Brazil, this concern has become even more

pressing. These regions house important production areas for ornamental, fruit, and other cultivated species, that are potential hosts for this pest.

Considering the detection of *S. dorsalis* in north-eastern and southeastern Brazil, along with its diverse range of host plants, the potential impact of its population on crops is substantial. Recognizing the potential of this species as a pest, it is crucial to emphasize the necessity for inspections by state and federal phytosanitary defense agencies. In this context, crops and the transit of plant material should be subjected to supervisory actions to prevent further distribution and mitigate the economic impact.

Material examined. BRAZIL

Minas Gerais: Lavras, on *Rosa* sp., 1.viii.2021, 2.xi.2021, 10.iii.2022, 38 females, 10 males, 4 larvae II (E.C.Alves col.) (CHNUFPI6361–6374 slide-mounted and CHNUFPI833 series in alcohol); Espírito Santo: São Mateus, on *Macadamia integrifolia*, 22.ii.2021, 7 females and 1 male (J.S.M.Prado col.) (CHNUFPI5027–5034); São Paulo: Dois Córregos on *Macadamia integrifolia*, 22.ii.2021, 8 females and 3 males, 3 larvae II, 25.ii.2021, 6 females and 1 male, 3 larvae II, 05.iv.2021, 3 females (J.S.M.Prado col.) (CHNUFPI5035–5061); Maranhão: São Luís, on *Passiflora edulis*, 17.xii.2012, 12 females (E.F.B.Lima col.) (CHNUFPI0686–0689, CHNUFPI0691, CHNUFPI0693–0695, CHNUFPI0697–0700); Piauí: Oeiras, on *Capsicum* sp., 23.xi.2022, 1 female, 1 male and 1 larva II (M.E.Duarte col.) (CHNUFPI6961–6963) (all slide-mounted, except where noted).

Acknowledgements Thanks to the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) for granting a scholarship to the first author. This contribution was partially funded by the National Council for Scientific and Technological Development (CNPq) Brazil.

Author contributions ECA conceived and designed the study. ECA, JSMP and EFBL insect collection. EFBL and NMOS taxonomic identification. ECA, JSMP, NMOS, BS, LMM, PLBTP and EFBL wrote the manuscript. ECA, JSMP, BS and EFBL revised the manuscript. BS and EFBL supervised the study. All the authors have read and approved the manuscript.

Funding The Article Processing Charge (APC) for the publication of this research was funded by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - Brasil (CAPES) (ROR identifier: 00x0ma614). Scholarship to the first author by the Coordenação de Aperfeiçoamento Pessoal de Nível Superior—Brasil (CAPES)—Financing Code 001. National Council

for Scientific and Technological Development (CNPq), Brazil (Process Number 313586/2025–0) (EFBL).

Data availability No datasets were generated or analysed during the current study.

Declarations

Competing interests The authors declare no competing interests.

Open Access This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

References

- Atakan, E., & Pehlivan, S. (2021). First report of the chili thrips, *Scirtothrips dorsalis* Hood, 1919 (Thysanoptera: Thripidae) in Turkey. *Turkish Journal of Zoology*, 45, 156–160. <https://doi.org/10.3906/zoo-2012-14>
- Bright, J. (2021). Macadamia plant protection guide 2021–2022. Department of Primary Industries, NSW Government.
- Bright, J. (2022). Macadamia Plant Protection guide 2022–2023. Department of Primary Industries, NSW Government.
- Centre for agriculture bioscience international. (2021). CABI — invasive species compendium. Accessed April, 21, 2022, from <https://www.cabi.org/isc>
- DGSV-DCNRF. (2024). Trips del chile. *Scirtothrips dorsalis*. Sader-Senasica. Dirección General de Sanidad Vegetal-Dirección del Centro Nacional de Referencia Fitosanitaria. *Ficha Técnica* (p. 11). Tecámac, Estado de México.
- Dias-Pini, N. S., Lima, M. G. A., Lima, E. F. B., Maciel, G. P. S., & Duarte, P. M. (2018). *Scirtothrips dorsalis* (Thysanoptera: Thripidae): A newly introduced polyphagous pest in northeastern Brazil. *Neotropical Entomology*, 47, 725–728. <https://doi.org/10.1007/s13744-018-0618-3>
- Dickey, A. M., Kumar, V. K., Hoddle, M. S., Funderburks, J. E., Morgan, J. K., Jara-Caveires, A., Shatters, R. G. J., Osborne, L. S., & Mckenize, C. L. (2015). The *Scirtothrips dorsalis* species complex: Endemism and invasion in a global pest. *PLoS ONE*. <https://doi.org/10.1371/journal.pone.0123747>
- Duraimurugan, P., & Jagadish, A. (2011). Preliminary studies on the biology of *Scirtothrips dorsalis* Hood (Thysanoptera: Thripidae) as a rose pest in India. *Archives of Phytopathology and Plant Protection*, 44, 37–45. <https://doi.org/10.1080/03235400902831141>
- Duraimurugan, P., & Jagadish, A. (2004). Non-chemical management of *Scirtothrips dorsalis* Hood damaging rose flowers. *Journal Applied Zoology*, 15, 163–265.
- Ebratt, E., Rodríguez, A., Monje, B., Varón, E., Brochero, H., & Goldarazena, A. (2018). Preferences of *Scirtothrips dorsalis* Hood 1919 (Thysanoptera: Thripidae) for different structures of cotton (*Gossypium hirsutum* L.) plants in the Magdalena warm valley of Colombia. *Agronomía Colombiana*, 36(1), 42–50. <https://doi.org/10.15446/agron.colomb.v36n1.66714>
- Ebratt-Ravelo, E. E., Vaca, J. U., Arévalo, E. P., Delgado, L., Díaz, M. F., Piñeros, L., Castro, A. P., Brochero, H., & Goldarazena, A. (2018). Presence and distribution of *Scirtothrips dorsalis* (Thysanoptera: Thripidae) in Colombia. *Journal of Insect Science*, 7, 1–10. <https://doi.org/10.1093/jisesa/iey092>
- EPPO Global Database (2025). *Scirtothrips dorsalis* – distribution. Accessed August 06, 2025, from <https://gd.eppo.int/taxon/SCITDO/distribution>
- Ferrari, L. D., Moriya, L. M., Lima, E. F. F., Luiz, A. J. B., & Marinho-Prado, J. S. (2021). Incidência de tripses em plantas de duas cultivares de macadâmia. *Anais do 15 Congresso Interinstitucional de Iniciação Científica CIIC 2021*, 21412, 10.
- Hilman, R., Abot, A. R., & Garcia, F. R. M. (2023). Prioritization of absent quarantine pests in Brazil through the Analytical Hierarchy Process. *Brazilian Journal of Biology = Revista Brasileira De Biologia*, 83, 1–10. <https://doi.org/10.1590/1519-6984.274333>
- Hoddle, M. S., & Mound, L. A. (2003). The genus *Scirtothrips* in Australia (Insecta, Thysanoptera, Thripidae). *Zootaxa*, 268, 1–40. <https://doi.org/10.11646/zootaxa.268.1.1>
- Kumar, P. S., & Rachana, R. R. (2021). *Scirtothrips dorsalis* (Thysanoptera: Thripidae) is a pest of celery *Apium graveolens* (Apiaceae: Apiaceae): First report and diagnostic characters. *Journal of Integrated Pest Management*, 46, 1–5. <https://doi.org/10.1093/jipm/pmab039>
- Kumar, D., Kamal, R. S., & Raju, S. V. S. (2019). Influence of environmental factors on the population dynamics of chilli thrips, *Scirtothrips dorsalis* (HOOD) and aphid, *Aphis gossypii* (GLOVER). *Journal of Experimental Biology and Agricultural Sciences*, 7, 289–294. [https://doi.org/10.18006/2019.7\(3\).289.294](https://doi.org/10.18006/2019.7(3).289.294)
- Kumar, V., Kakkar, G., Mckenzie, C. L., Seal, D. R., & Osborne, L. S. (2013). An overview of chilli thrips, *Scirtothrips dorsalis* (Thysanoptera: Thripidae) biology, distribution and management. In S. Soloneski, M. Larra-mendy (Eds.), *Weed and pest control: conventional and new challenges*, (pp. 52–77). InTech, London. <https://doi.org/10.5772/55045>
- Lima, E. F. B., O'Donnell, C. A., Sousa, Y. L. C., & Zamar, M. I. (2021). Identification of second instar larvae of Panchaetothripinae (Thysanoptera, Thripidae) in Brazil and Argentina. *Zootaxa*, 5047, 453–464. <https://doi.org/10.11646/zootaxa.5047.4.5>

- Lima, E. F. B., Silva, L. M. R., Fontes, L. S., & de Borbón, C. M. (2022). Identification of second instar larvae of thrips (Thysanoptera: Thripidae) vectors of *Orthotospovirus* (Tospoviridae) in South America. *Austral Entomology*, 61, 199–208. <https://doi.org/10.1111/aen.12597>
- López-Lima, D., Tajeda-Reyes, M. A., Rodríguez-Málaga, R. D., López-Bautista, E., Salinas-Castro, A., & Illescas-Riquelme, C. P. (2023). New hosts, distribution, and color trap preference of the invasive thrips *Scirtothrips dorsalis* (Thysanoptera: Thripidae) in Mexico. *Journal of Entomological Science*, 58, 400–411. <https://doi.org/10.18474/JES23-11>
- Mannion, C. M., Derksen, A. I., Seal, D. R., Osborne, L. S., & Martin, C. G. (2013). Effects of rose cultivars and fertilization rates on populations of *Scirtothrips dorsalis* (Thysanoptera: Thripidae) in Southern Florida. *Florida Entomologist*, 96, 403–411.
- MAPA Ministério da Agricultura e Pecuária. (2022, July 12). Portaria DAS/MAPA nº 617, de 12 de julho de 2022. D.O.U nº 130, Seção 1, pgs. 9–13, 12/7/2022. Accessed July 12, 2022, from <https://www.gov.br/agricultura/pt-br/assuntos/sanidade-animal-e-vegetal/sanidade-vegetal/analise-de-riscos-de-pragas>
- Mound, L. A., & Palmer, J. M. (1981). Identification, distribution and host-plants of the pest species of *Scirtothrips* (Thysanoptera: Thripidae). *Bulletin of Entomological Research*, 77, 467–479. <https://doi.org/10.1017/S0007485300008488>
- Mound, L. A., & Stiller, M. (2011). Species of the genus *Scirtothrips* from Africa (Thysanoptera, Thripidae). *Zootaxa*, 2786, 51–61. <https://doi.org/10.11646/zootaxa.2786.1.4>
- Mound, L. A., Wang, Z., Lima, E. F. B., & Marullo, R. (2022). Problems with the concept of “pest” among the diversity of pestiferous thrips. *Insects*, 13, 1–17. <https://doi.org/10.3390/insects13010061>
- Nakayama, K., & Lindner, M. F. (2022). Ocorrência do trips da pimenta (*Scirtothrips dorsalis* Hood, [Thysanoptera: Thripidae]) em cacauzeiro (*Theobroma cacao* L.). *Agrotrópica*, 34, 121–130. <https://doi.org/10.21757/0103-3816.2022v34n2p121-130>
- Onkarappa, A., & Mallik, B. (1998). Distribution and management of *Scirtothrips dorsalis* Hood (Thysanoptera: Thripidae) on rose. In P. P. Reddy, N. K. Kumar, & A. Verghese (Eds.), *Advances in IPM for horticultural crops* (pp. 165–167). Indian Inst. Hort. Res. Bangalore.
- Ortiz, J. A., Infante, F., Rodríguez, D., & Toledo-Hernandez, R. A. (2020). Discovery of *Scirtothrips dorsalis* (Thysanoptera: Thripidae) in blueberry fields of Michoacan, Mexico. *Florida Entomologist*, 103, 408–410. <https://doi.org/10.1653/024.103.0316>
- Pessoa, M. C. P. Y., Moruya, L. M., Mingoti, R., Marinho-Prado, J. S., & Piva, P. L. B. (2022). *Scirtothrips dorsalis* e prospecção de seu desenvolvimento em condições térmica de Dois Córregos, SP. In J. M. B. Oliveira-Junior, L. B. Calvão, (org) (Eds.), *Entomologia: estudos sobre a biodiversidade, fisiologia, controle e importância médica dos insetos 2* (pp. 71–89). Atena, Ponta Grossa, PR.
- R Core Team. (2022). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL <https://www.R-project.org/>
- Vierbergen, G., Kucharczyk, H., & Kirk, W. D. J. (2010). A key to the second instar larvae of the Thripidae of the Western Palaearctic region (Thysanoptera). *Tijdschrift Voor Entomologie*, 153, 99–160. <https://doi.org/10.1163/22119434-900000294>
- Vitelli, R. (2014). The development of DC-092 for the control of spotting bug in macadamia nut and tropical inedible peel crops. Project Number: MT12024, Horticulture Innovation Australia, (p. 53). https://www.australianlychee.com.au/images/lychee/lychee_docs/Final_reports/Final%20Report%20MT12024%20%20DC092%20Control%20of%20spotting%20bug%20in%20Macadamia%20%20tropical%20inedible%20peel%20crops.pdf

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.