# 9th Meeting of the IOBC-WPRS Working Group

## "Integrated Control of Plant-Feeding Mites"

8-11 September 2025

Izmir, Türkiye

# BOOK OF ABSTRACTS


Editors:

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## WELCOME NOTE

Dear colleagues

It is a great pleasure to welcome you to the 9th Meeting of the IOBC-WPRS Working Group "*Integrated Control of Plant-Feeding Mites*", held in Izmir, Türkiye, from 8 to 11 September 2025.

This meeting brings together 49 participants from 17 countries, including scientists, experts, and students, providing a dynamic platform for sharing recent research on the biology, ecology, and integrated control of plant-feeding mites. The scientific program consists of two invited lectures, 35 oral, and 14 poster presentations, organized over two days of sessions.

We hope that you will find the meeting intellectually stimulating and that it will foster lively discussions, new collaborations, and meaningful exchanges, not only during the scientific sessions but also through the social events including the welcome reception, gala dinner, and post-conference excursion.

Sincerely,

On behalf of the Organizing Committee,

*Ismail DÖKER*

## WORKING GROUP CONVENER

*George D. BROUFAS (Democritus University of Thrace, Greece)*

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*Hatice YAVAS (Cukurova University)*

**KEYNOTE SPEAKERS**

**Alireza Saboori** is a full professor in Acarology at University of Tehran, Iran, and a part-time professor at Aydin Adnan Menderes University, Türkiye and works on terrestrial Parasitengona mites. He is the president of the Acarological Society of Iran and Editor in Chief of the Persian Journal of Acarology, subject editor of Experimental and Applied Acarology and Biologia/Bratislava, and Journal of Entomological Society of Iran, and member of the Editorial Board of Acarologia, International Journal of Acarology, Ecologica Montenegrina, Acarological Studies, Natura Montenegrina, Iranian Journal of Animal Biosystematics, Iranian Journal of Plant Protection Research, Progress in Biological Sciences, etc. Also, he is an invited member of the Plant Protection Committee of the Academy of Science, the Committee of Entomology, and Acarology, Academy of Persian Language and Literature, member of the Mite Specialist Group of IUCN, member of the Working Group on the Authority of the World Classification Organization of Iran, and member of the Executive Committee of Iranian Association of Plant Protection Societies. He published more than 300 papers.

**Dr. Dejan Marčić** is a Principal Research Fellow at the Institute of Pesticides and Environmental Protection (Belgrade, Serbia). He completed his PhD at Faculty of Agriculture, University of Belgrade. His research interests focus on acaricide toxicology and resistance, integrated control of spider mites, application of life tables in acarology, and biopesticides. He taught the Arthropods and Pesticides course at the Faculty of Biology at the University of Belgrade as part of the PhD programme. He has published 150+ scientific articles and a book on acaricides, reviewed 250+ manuscripts for leading acarological and entomological journals, and edited several congress proceedings. He serves as academic editor in charge of manuscripts dealing with acaricides in the journals Systematic and Applied Acarology and Acarologia. He was local organizer of the 8th meeting of the IOBC-WPRS WG "*Integrated Control of Plant-Feeding Mites*", held in Belgrade, Serbia, in 2023.

# PROGRAM

## Monday, September 8th

(T Block, Yaşar University Campus)

17:00 – 19:00 **Registration and Presentation Upload**
19:00 – 21:00 **Welcome Cocktail**

## Tuesday, September 9th

(Y Block, Yaşar University Campus)

08:30 – 09:00 **Registration and Presentation Upload**
09:00 – 09:15 **Welcome and Introduction**
Ismail TÜRKAN (Dean, Faculty of Agricultural Sciences and Technologies)
Ismail DÖKER (Local Organizer)

### INVITED TALKS

Moderator: George D. BROUFAS

09:15 – 10:00 *Alireza Saboori*
**Trombidioidea (Trombidiformes: Prostigmata) as natural biocontrol agents**

10:00 – 10:45 *Dejan Marčić, Ismail Döker, Haralabos Tsolakis*
**What we talk about when we talk about bioacaricides?**

10:45 – 11:10 **COFFEE BREAK**

### SESSION 1 – Historical perspectives, and the biology, ecology and behavior of plant-feeding mites

Moderators: Rostislav ZEMEK and Ibrahim CAKMAK

11:10 – 11:30 OP1 *Sauro Simoni, Marcello De Giosa, Silvia Guidi, Franca Tarchi, Donatella Goggioli, Elena Gagnarli, Marisa Castagnoli, Marialivia Liguori, Pio Federico Roversi, Roberto Nannelli*
**Antonio Berlese: A scientist ahead of his time, yet enduring through every era**

11:30 – 11:50 OP2 *Pattara Opadith, Norihide Hinomoto*
**Lethal temperature and tropical non-host plants of the European red mite, *Panonychus ulmi* (Koch) (Prostigmata: Tetranychidae)**

11:50 – 12:10 OP3 *PhD. Competition* *Esma Kaplan, Bugra Guvercin, Izzet Akca*
**Damage intensity of hazelnut big bud mite in hazelnut orchards of Giresun Province, Türkiye**

12:10 – 12:30 OP4 *PhD. Competition* *Octavio C. Rossetti, Fernanda G. Araújo, Walter S. de Araújo, Rodrigo D. Daud*
**Plants mites (Arachnida: Acariformes, Parasitiformes) in Caatinga remnants from Piauí State, Brazil**

**SESSION 2 – Biology, ecology and behavior of phytoseiid mites**

Moderators: Maria L. PAPPAS and Sophie Le HESRAN

13:30 – 13:50 OP5
*Ioannis Bakirtzis, Anastasia Pantelidou, Konstantinos Samaras, Maria L. Pappas, George D. Broufas*
**Effects of laboratory selection for pirimicarb resistance on *Euseius finlandicus* fitness**

13:50 – 14:10 OP6
*Yuki Kato, Minori Sekiguchi, Norihide Hinomoto*
**Vitality of *Phytoseiulus persimilis* (Mesostigmata: Phytoseiidae) can be kept on alternative prey even after long flights**

14:10 – 14:30 OP7 *PhD. Competition*
*Shogo Usugi, Shingo Toyoshima, Norihide Hinomoto*
**Comparison of the Japanese indigenous phytoseiid mite *Amblyseius rademacheri* and the non-native phytoseiid mite *A. swirskii***

14:30 – 14:50 OP8
*Juliette Pijnakker, Marion Cellier, Yves Arijs, Marvin Koot, Felix Wäckers*
**Pollen as an alternative or supplemental food for predatory mites in greenhouse cucumber crops**

14:50 – 15:20 **COFFEE BREAK**

15:20 – 15:40 OP9
*Natali Nacev, Christel van Leeuwen, Anton Bekendam, Markus Knapp*
**Predation- and oviposition capacity of five generalist predatory mite species at different temperatures**

15:40 – 16:00 OP10 *PhD. Competition*
*Mete Soysal, Rana Akyazı*
**Comparative life table analysis of native and commercial *Neoseiulus californicus* populations preyed on *Phytonemus pallidus fragariae* on Albion strawberry cultivar**

16:00 – 16:20 OP11
*Syed Usman Mahmood, Nwanade Chuks Fidelis, Meng Jianglei, XiaoDuan Fang*
**Behavioral and ecological response of *Amblyseius largoensis* to HIPVs from citrus red mite-infested plants**

16:20 – 16:40 OP12
*Tuğba Çakar, Dürdane Yanar*
**Predation capacity of *Galendromus occidentalis* and *Neoseiulus californicus* on different stages of the two-spotted spider mite, *Tetranychus urticae***

**SESSION 3 – Potential of non-phytoseiid predators for biological control of pests**

Moderators: Sebahat K. OZMAN-SULLIVAN and Dominiek VANGANSBEKE

16:40 – 17:00 OP13
*Robbe Maertens, Dominiek Vangansbeke, Marcus Duarte, Jonas Merckx, Heidi Debie, Elana De Roo, Stijn Bellinkx, Rob Moerkens, Juliette Pijnakker, Felix Wäckers*
**Is there a place for iolinid predatory mites in biological control of pests and diseases?**

17:00 – 17:20 OP14
*Rostislav Zemek, Jiunn Luh Tan*
***Anystis* spp. (Prostigmata: Anystidae): Versatile generalist predators with potential in biological control**

17:20 – 17:40 OP15 *PhD. Competition*
*J. Alexandra Sierra-Monroy, Tiara Monicha, Jacques A. Deere, Marta Montserrat, Arne Janssen*
**A predatory soil mite as potential biological control agent of the invasive *Echinothrips americanus* and *Thrips parvispinus***

17:40 – 18:00 *General Assembly: Convener Election & Venue Selection for the Next Meeting*

18:00 – 19:00 **POSTER SESSION**

(Y Block, Yaşar University Campus)

PP1 *Berna Kaymak Kara, Selime Ölmez Bayhan*
**Potential of *Neoseiulus barkeri* in the biological control of *Tetranychus urticae***

PP2 *Ismail M. Abdirahman, Cengiz Kazak*
*PhD. Competition*
**Influence of temperature and humidity on the life table parameters of the Citrus brown mite *Eutetranychus orientalis* (Klein) (Prostigmata: Tetranychidae)**

PP3 *Sophie Le Hesran, Denise Sewkaransing, Nathan Koedijk, Ada Leman*
**Predatory mites and leaf surfaces**

PP4 *Ismail Döker, Robin, Anna Jose, Paramjit Kaur, Channegowda Chinnamade Gowda, Manmeet Brar Bhullar*
**Too many names, too little clarity: the first step toward resolving *Euseius* (Mesostigmata. Phytoseiidae) chaos by synonymizing 18 species from the Oriental region**

PP5 *İpek Yaşar, Parisa Lotfollahi, Arash Honarmand, İsmail Kasap*
*PhD. Competition*
**Nine new Eriophyoidea (Acari: Trombidiformes) records from Türkiye**

PP6 *Irena Medjo, Ismail Döker, Hatice Yavaş, M. Mete Karaca, Kamil Karut, Cengiz Kazak*
**Friend or foe? The hidden threat of "reduced-risk" pesticides to *Euseius scutalis* (Athias-Henriot) (Parasitiformes: Phytoseiidae)**

PP7 *Zehra Avcioğlu, Recep Ay*
**Comparative toxicity of dimpropyridaz on *Tetranychus urticae* Koch (Acari: Tetranychidae) and *Phytoseiulus persimilis* Athias-Henriot (Acari: Phytoseiidae)**

PP8 *Dejan Marčić, Ismail Döker, Cengiz Kazak*
**Spinosyns as acaricides: contrasting results to consider**

PP9 *Alihan Emre ARI, Ramazan AKTÜRK, Arif MERMER, Sibel YORULMAZ*
**Acaricidal activities of new potential oxadiazole derivatives on *Tetranychus urticae* Koch (Prostigmata:Tetranychidae)**

PP10 *Stanislav Trdan, Farid Faraji, Jeno Kontschan, Tanja Bohinc*
**First results of systematic sampling of soil predatory mites in Slovenia**

PP11 *Berna Kaymak Kara, Selime Ölmez Bayhan*
**Population density of *Tetranychus urticae* and its predators in eggplant fields in Diyarbakır, Türkiye**

PP12 *Octavio C. Rossetti, Walter S. de Araújo, Rodrigo D. Daud*
*PhD. Competition*
**Ecological patterns and biome-specific associations of plant-inhabiting mite communities (Arachnida: Acariformes, Parasitiformes) in Brazilian biomes**

PP13 *Berna Kaymak Kara, Selime Ölmez Bayhan, Sultan Çobanoğlu*
**Diversity of mite species in vegetable-growing areas of Diyarbakır, Elazığ, and Muş Provinces, Türkiye**

PP14 *Angelos Bechtsoudis, Maria L. Pappas, Konstantinos Samaras, George D. Broufas*
**Effectiveness of the indigenous predatory mite *Amblyseius andersoni* in suppressing tomato pests under laboratory conditions**

Wednesday, September 10th

(Y Block, Yaşar University Campus)

**SESSION 4 – Ecological complexities and integrated mite management strategies**

Moderators: Sauro SIMONI and Norihide HINOMOTO

09:00 – 09:20 OP16
*Sauro Simoni, Sabrina Bertin, Anna Sybilska, Franca Tarchi, Donatella Goggioli, Anna Taglienti, Marta Luigi, Davide Luison, Francesco Faggioli, Antonio Tiberini, Mariusz Lewandowski*
**Epidemiological crossroads: Tomato russet mite, ToFBV, and the escalating stakes for integrated pest and disease management in tomato cropping systems**

09:20 – 09:40 OP17
*Maria L. Pappas, Ioanna Maria Katsimiga, Evangelia Karakosta, George D. Broufas, Anastasia Tsagkarakou*
**Evaluating different tomato cultivars for their effects on mite pests of tomato**

09:40 – 10:00 OP18
*Ismail Döker, Hatice Yavaş, M. Mete Karaca, Kamil Karut, Cengiz Kazak*
**Interactions between *Amblyseius swirskii* and *Euseius scutalis* co-occurring in citrus ecosystems of the eastern Mediterranean region, Türkiye**

10:00 – 10:20 OP19
*Mustafa Altintas, Peter Schausberger*
**Sex-specific parental intraguild predation risk affects daughters' boldness in predatory mites**

10:20 – 10:40 OP20
*PhD. Competition*
*Ioannis Bakirtzis, Anastasia Pantelidou, Konstantinos Samaras, George D. Broufas, Maria L. Pappas*
**Assessing resistance to pirimicarb in different populations of *Euseius finlandicus* from Greece**

10:40 – 11:10 **COFFEE BREAK**

11:10 – 11:30 OP21
*Elias Böckmann*
**Physical barriers limiting *Aculops lycopersici* (Tyron) population growth on tomato**

11:30 – 11:50 OP22
*PhD. Competition*
*Angelos Bechtsoudis, Anastasia Pantelidou, Ioannis Bakirtzis, Maria L. Pappas, George D. Broufas*
**Laboratory selection for improved tomato compatibility in phytoseiids**

11:50 – 12:10 OP23
*PhD. Competition*
*Anastasia Pantelidou, Ioannis Bakirtzis, George D. Broufas, Maria L. Pappas*
**Compatibility of commercial tomato cultivars with the predatory mite *Phytoseiulus persimilis***

12:10 – 12:30 OP24
*Anne Muola, Annette Folkedal Schjøll, Belachew Asalf Tadesse*
**Interactions between bulb mites (*Rhizoglyphus* sp.) and *Fusarium oxysporum* f. sp. *cepae* in Norway**

12:30 – 12:50 OP25
*Bilal Saeed Khan, Muhammad Aneeb Shahzad, Zahid Mahmood Sarwar*
**An integrated management approach against *T. urticae* (Prostigmata: Tetranychidae) through aqueous extracts of some botanicals and a predator, *Neoseiulus barkeri* (Mesostigmata: Phytoseiidae) in laboratory**

12:50 – 14:00 **LUNCH**

**SESSION 5 – Faunistic studies regarding pests and their predators**

Moderators: Ismail KASAP and Elias BÖCKMANN

14:00 – 14:20 OP26
*Irena Mavrič Pleško, Barbara Grubar, Aljoša Beber, Nika Krivec, Eva Kovačec, Janja Lamovšek*
**Progress in molecular identification of eriophyoid mites for the purpose of virus vector identification in Slovenia**

14:20 – 14:40 OP27
*Ibrahim Cakmak, Fatma Pamuk, Ismail Döker, Alireza Saboori*
**Differences in mite species composition and populations between short-day and neutral-day strawberry cultivars**

14:40 – 15:00 OP28 *PhD. Competition*
*Vladimir D. Gankevich, Philipp E. Chetverikov*
**Retesting *Cecidophyinae* (Eriophyoidea) monophyly using comparative mitogenomics reveals chaos in gall mite GenBank sequences**

15:00 – 15:20 OP29 *PhD. Competition*
*Esma Kaplan, Andrzej Kazmierski, Ismail Döker, Sebahat K. Ozman-Sullivan*
**Predatory mite species on pistachio trees in Türkiye**

15:20 – 15:40 OP30 *PhD. Competition*
*İpek Yaşar, Ismail Döker, Şahin Kök, İsmail Kasap*
**Phytoseiidae (Parasitiformes: Mesostigmata) mites associated with Eriophyoidea (Trombidiformes: Prostigmata) species in Kaz Dağları (Mount Ida), Türkiye**

15:40 – 16:00 OP31
*Ivana Marić, Irena Međo, Luka Stojanović, Ismail Döker, Edward A. Ueckermann*
**Spider mites (Prostigmata: Tetranychidae) from Serbia: review and recent reports**

16:00 – 16:30 **COFFEE BREAK**

**SESSION 6 – Impacts of climate change on mites**

Moderators: Dejan MARČIĆ and Markus KNAPP

16:30 – 16:50 OP32
*Andreas Walzer, Larissa Bailhache*
**Are climate warming- or management effects responsible for the low diversity of predatory mites in commercially used apple orchards?**

16:50 – 17:10 OP33 *PhD. Competition*
*Chenhao Wang, Minori Sekiguchi, Norihide Hinomoto*
**When it gets hot, who's on the menu? Impact of temperature on prey preference in *Amblyseius andersoni* (Acari: Phytoseiidae)**

17:10 – 17:30 OP34
*Ivana Marić, Irena Međo, Luka Stojanović, Edward A. Ueckermann, Ismail Döker*
**Unexpected occurrence, spread and domination of citrus red mite *Panonychus citri* McGregor (Prostigmata: Tetranychidae), in apple orchards in Serbia**

17:30 – 17:50 OP35 *PhD. Competition*
*Octavio C. Rossetti, Maria Victória Cordeiro Gama, Giovanna Cavalcante Mendes, Rodrigo D. Daud*
**Influence of native vegetation loss and fragmentation on mite diversity in soybean crops**

17:50 – 18:00 CLOSING SESSION
19:00 – 23:00 *GALA DINNER (Rakısal Restaurant, Küçükpark, Bornova)*

## Thursday, September 11th

### Excursion

| | |
|---|---|
| 09:00 | Departure (Meeting point Yaşar University, C Gate) |
| 10:00 – 11:30 | Guided tour to Uzbas Arboretum |
| 11:30 – 13:00 | Guided wine tasting in Urla Winery |
| 13:00 – 14:30 | LUNCH (Polima Museum Restaurant) |
| 14:30 – 17:00 | Guided tour to Köstem Olive Oil Museum |
| 17:30 | Departure to Izmir |
| 19:00 | Arrival |

**ABSTRACTS**

*INVITED TALKS*

## Trombidioidea (Trombidiformes: Prostigmata) as natural biocontrol agents

**Alireza Saboori[1]**

*[1]Department of Plant Protection, Faculty of Agriculture, University of Tehran, Karaj, Iran. E-mail: saboori@ut.ac.ir*

**Abstract:** The mites of the superfamily Trombidioidea are large mites commonly found in soil, leaf litter, and other terrestrial habitats. Trombidioidea belongs to the cohort Parasitengona, characterized by a complex life cycle that includes the stages of egg, pre-larva, larva, protonymph, deutonymph, tritonymph, and adult. This cohort encompasses three epifamilies and 12 families. With few exceptions, the larvae are parasitic on various invertebrates, morphologically distinct from the free-living postlarval stages, which are predators of small arthropods. As their prey and hosts include economically important insects and mites, these mites are regarded as potential biocontrol agents. Larvae are ectoparasites, while deutonymphs and adults are free-living predators, usually univoltine. Rates of parasitism by trombidioid larvae vary among them; for example, 0.79–4.88% of *Cerotoma trifurcata* (Chrysomelidae) are parasitized by *Trombidium* larvae, 10% of lucerne aphids by *Allothrombium monspessulanum* larvae, and 100% of *Aphis gossypii* by *Al. ovatum* larvae. Each deutonymph and adult of *Al. monspessulanum* can consume several aphids daily, and an adult mite can eat up to 20 eggs per day of the beetle *Sitona discodeus* (Curculionidae). A deutonymph of *Al. fuliginosum* can consume an average of 36 immature spider mites daily, exhibiting a typical type II functional response. Each nymph consumes 49 to 54 *Hegesidemus habrus* (Tingidae) daily, while each adult consumes 85 prey/day. Their widespread occurrence and abundance are not the only traits that make them strong biocontrol candidates. They move swiftly and possess a remarkable searching ability, and their larvae can suppress early aphid populations in the absence of other predatory or parasitic insects. However, their long life cycle, extended quiescent stages, wide range of hosts, and high mortality in lab rearing complicate their use in inoculative releases via mass production. Future use should focus on augmentation through protection or conservation in natural habitats or by introducing new areas.

**Keywords:** biological control, ectoparasitic larva, predator, prey, terrestrial Parasitengona

## What we talk about when we talk about bioacaricides?

**Dejan Marčić[1], Ismail Döker[2], Haralabos Tsolakis[3]**

*[1]Institute of Pesticides and Environmental Protection, Laboratory of Applied Entomology, 11080 Belgrade-Zemun, Serbia; [2]Cukurova University, Agricultural Faculty, Department of Plant Protection, 01330, Adana, Türkiye; [3]Department of Agricultural, Food and Forestry Sciences, University of Palermo, Viale delle Scienze 13, Ed. 5, 90128 Palermo, Italy. E-mail: dejan.marcic@pesting.org.rs*

**Abstract:** Bioacaricides are commercial biopesticide products based on microorganisms (microbial acaricides) and biologically active substances of microbial, plant or animal origin (biochemical acaricides and semiochemicals) used in crop protection against plant-feeding mites. The most important among microbial acaricides are mycoacaricides, products

manufactured from living propagules of *Beauveria bassiana*, *Metarhizium anisopliae* and several other acaropathogenic fungi. Abamectin, a mixture of neurotoxic macrocyclic lactones obtained by fermentation from *Streptomyces avermitilis*, is the most important biochemical acaricides of microbial origin. Among the biochemical acaricides of plant origin (botanicals), the most widely used are the products based on azadirachtin, a growth regulator and a feeding deterrent obtained from the Indian neem tree, *Azadirachta indica* (Meliaceae), and pyrethrum, a neurotoxic oleoresin obtained from the Dalmatian daisy, *Tanacetum cinerariifolium* (Asteraceae). The third important source of botanicals are essential oils, complex volatile mixtures of monoterpenes and sesquiterpenes with neurotoxic action, derived from a number of aromatic plants belonging to the families Lamiaceae, Myrtaceae, Rutaceae and some others. Semiochemicals are of minor importance in the control of plant-feeding mites. The highest effectiveness of bioacaricides is usually achieved through their inclusion in the integrated pest management (IPM) programs.

**Keywords:** biopesticides, bioacaricides, plant-feeding mites

***SESSION 1 – Historical perspectives, and the biology, ecology and behavior of plant-feeding mites***

## Antonio Berlese: A scientist ahead of his time, yet enduring through every era

**Sauro Simoni[1], Marcello De Giosa[2], Silvia Guidi[1], Franca Tarchi[1], Donatella Goggioli[1], Elena Gagnarli[1], Marisa Castagnoli[1], Marialivia Liguori[1], Pio Federico Roversi[1], Roberto Nannelli[1]**

*[1]CREA - DC, Council for Agricultural Research and Economics, Research centre for Plant Protection and Certification, via di Lanciola12/a 50125 FIRENZE, Italy*
*[2]Tropical Research and Education Center, Entomology and Nematology Department, Institute of Food and Agricultural Sciences, University of Florida, HOMESTEAD, Florida, 33031, USA.*
*E-mail: sauro.simoni@crea.gov.it*

**Abstract:** Antonio Berlese (1863-1927) was a pioneering and leading Italian scientist whose contributions spanned several disciplines, primarily in the fields of entomology, acarology, and agricultural zoology. His work had a profound impact, particularly in the study of insects and mites, and he is recognized for his multidisciplinary approach. Berlese is renowned, for example, for inventing the Berlese funnel (or Berlese-Tullgren funnel), an ingenious apparatus for extracting small arthropods from soil and litter. Developed in the late 19th century, this tool is still widely used today in ecology and zoology for biodiversity studies of soil organisms. He is recognized as the father of modern acarine systematics, having meticulously described and classified an immense number of mite species. His detailed morphological descriptions, precise illustrations, and comprehensive taxonomic keys were revolutionary, setting rigorous standards that continue to assist acarological research. Berlese's contributions to pest management were pioneering and continue to resonate with contemporary agricultural priorities, particularly in the pursuit of sustainable alternatives to chemical pesticides. His publications, including the multi-volume "Gli Insetti" (The Insects), remain reference texts. Berlese founded and directed scientific journals like the "Agricultural Entomology Bulletin" and "Redia", which continue to promote zoological studies applied to agriculture and forestry. In essence, Berlese was not merely a scientist of his era but a visionary whose insights, inventions, and rigorous taxonomic

work created indispensable tools, methods, and foundational datasets. His ability to establish functional setups for research and to systematically build knowledge about biodiversity demonstrates a continuous relevance over time.

**Keywords**: acarology, scientific research, mite taxonomy, agricultural zoology, agricultural entomology, scientific publishing, dissemination

## Lethal temperature and tropical non-host plants of the European red mite, *Panonychus ulmi* (Koch) (Prostigmata: Tetranychidae)

**Pattara Opadith[1], Norihide Hinomoto[2]**

*[1]Plant Pest Surveillance, Plant Quarantine Research Group, Department of Agriculture, Ministry of agriculture and Cooperatives, Bangkok, Thailand*
*[2]Laboratory of Ecological Information, Graduate School of Agriculture, Kyoto University, Kyoto 606-8502, Japan. E-mail: pattara25@yahoo.co.th*

**Abstract:** To understand the survival of *Panonychus ulmi* under current global warming conditions, this study focused on its thermal resistance. *Panonychus ulmi* exhibits minimal mortality when exposed to high temperatures ranging from 32°C to 41°C. However, it was unable to survive temperatures above 44°C when heat stress was directly applied to adult females. Therefore, this thermal tolerance may enhance its potential to spread and establish in new areas especially tropical region. Moreover, we found non-host plants of *P. ulmi* such as basil, longan, lychee, marigold, mango, paper flower, sunflower, tomato and chilli, all of which economically important crops in Thailand.

**Keywords**: European red mite, *Panonychus ulmi*, lethal temperature

## Damage intensity of the hazelnut big bud mites in hazelnut orchards of Giresun Province, Türkiye

**Esma Kaplan[1], Bugra Guvercin[2], Izzet Akca[3]**

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**Abstract:** Eriophyoid mites are extremely small organisms and highly specialized to their host plants. They occur in two forms: gall-forming and vagrant. Some gall-forming species are important agricultural pests that feed intensively on plants and cause deformations. Among them, hazelnut big bud mites, *Phytoptus avellanae* (Nalepa) and *Cecidophyopsis vermiformis* (Nalepa) (Acari: Eriophyoidea) feed on generative buds of hazelnut plants and lead to substantial crop losses. The study conducted in 2024, aimed to assess the extent of damage caused by the hazelnut big bud mites in hazelnut orchards in Giresun Province, Türkiye. Sampling was carried out at 10-day intervals across a total of 11 orchards. In each orchard, 10 hazelnut plants (locally known as ocak, a traditional multi-stemmed hazelnut growing unit) were randomly selected and visual gall counts were performed. The highest gall density was recorded in July, with an average of 12.50±1.54 galls per ocak. During the vegetation period, the overall average was 9.04±1.48 per ocak, with a maximum of 28.70 (galls/ocak) observed.

These findings indicate that the infestation of hazelnut big bud mites poses a significant economic threat and requires for effective control measures.

**Keywords:** Acari, Eriophyoidea, hazelnut big bud mites, population density, damage

## Plants mites (Arachnida: Acariformes, Parasitiformes) in Caatinga remnants from Piauí State, Brazil

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**Abstract:** The Caatinga, a highly threatened Brazilian biome, remains poorly studied regarding its mite fauna. This study surveyed plant-inhabiting mites in two native vegetation remnants in southern Piauí, Brazil. A total of 177 mites from nine species were recorded on seven plant species. Predatory mites were dominant (68%), especially those from the Iolinidae family, with *Pronematus* sp. being the most abundant. The phytophagous mites *Aculus* sp. and *Oligonychus* sp. were also frequent. Notably, *Neoseiulus tunus* (Phytoseiidae) was reported for the first time in Piauí. This is the first scientific record of mite species from native vegetation remnants exclusively within this state, highlighting the need for further biodiversity research in the Caatinga.

**Keywords:** Acari, Mesostigmata, mite diversity, natural vegetation, Phytoseiidae

***SESSION 2 – Biology, ecology and behavior of phytoseiid mites***

## Effects of laboratory selection for pirimicarb resistance on *Euseius finlandicus* fitness

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**Abstract:** The predatory mite *Euseius finlandicus* is a widespread phytoseiid species in fruit orchards in Northern Greece, where it is frequently exposed to intense pesticide applications. In the present study, the effects of laboratory selection for increased insecticide resistance on the fitness characteristics of a field-collected population of this predatory mite were investigated. Continuous exposure to fresh pirimicarb residues over six successive generations had led to a significant 3.2-fold increase in the $LC_{50}$ value of the selected population to pirimicarb. However, key demographic parameters including developmental time, juvenile

survival and fecundity, as well as the intrinsic rate of population increase ($r_m$), remained unaffected by the selection process, showing no significant differences between the initial and the selected (resistant) populations. Further research is necessary to elucidate the mechanisms underlying resistance and to assess the potential for incorporating the resistant population of *E. finlandicus* in Integrated Pest Management (IPM) strategies targeting key pests of crops.

**Keywords:** biological control, *Euseius finlandicus*, fitness, phytoseiids, pirimicarb, resistance

*The study was part of the project "Innovations in Plant Protection for sustainable and environmentally friendly pest control, InnoPP - TAEDR-0535675" that is Funded by the European Union-Next Generation EU, Greece 2.0 National Recovery and Resilience plan, National Flagship Initiative "Agriculture and Food Industry".*

## Vitality of *Phytoseiulus persimilis* (Mesostigmata: Phytoseiidae) can be kept on alternative prey even after long flights

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**Abstract:** The feeding ability and fecundity in the predatory mite *Phytoseiulus persimilis* commercial packages were evaluated just after delivery. These were shipped from the Netherlands to Japan by air; therefore, several days were required for transportation. Adult females with alternative prey (Spidex Vital) fed on approximately 1.5 times more spider mite eggs than adult females without prey (Spidex). The average number of eggs laid by adult females of Spidex Vital was 0.6 within 24 h, while adult females of Spidex did not. These results indicate that the activity of biological control agents can be maintained by bundling alternative prey even during prolonged transportation.

**Keywords:** *Phytoseiulus persimilis*, alternative prey, feeding ability, fecundity

## Comparison of the Japanese indigenous phytoseiid mite *Amblyseius rademacheri* and the non-native phytoseiid mite *A. swirskii*

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**Abstract:** *Amblyseius rademacheri*, a phytoseiid mite native to Japan, is taxonomically and morphologically similar to *A. swirskii*, one of the most effective biological control agents (BCAs) for controlling thrips and whiteflies. Some biological parameters of *A. rademacheri* were evaluated to contribute to assess its role as BCA and to compare the two phytoseiid species regarding these parameters. The results showed no significant differences in sex ratio, developmental period, or number of eggs laid between the two species. In addition, we fed first

instar larvae of western flower thrips, *Frankliniella occidentalis*, to the two species to assess their predation rates. *Amblyseius rademacheri* exhibited significantly higher predation rates than *A. swirskii* across the temperature conditions examined (15°C, 20°C, and 25°C). Based on these results, *A. rademacheri* bears a striking resemblance to *A. swirskii* in its life history traits and exhibits a high predatory capacity, suggesting that it has strong potential as an effective BCA.

**Keywords:** predatory mites, *Amblyseius rademacheri*, *Amblyseius swirskii*, biological control, developmental period, oviposition, predation, *Frankliniella occidentalis*

## Pollen as an alternative or supplemental food for predatory mites in greenhouse cucumber crops

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**Abstract:** Over the last twenty years, biological control in protected cucumber crops in Northern Europe has shifted toward the use of generalist predatory mites, *Amblyseius swirskii* and *Transeius montdorensis*, which outperform *Neoseiulus cucumeris* in controlling thrips and whiteflies. Prior to the introduction of food supplements, these predators struggled to establish preventatively due to the lack of suitable pollen and prey. Since the launch of *Typha angustifolia* pollen (Nutrimite™) in 2013, it has become possible to maintain predator populations before pest outbreaks. This study a retrospectively review of an early successful cucumber trial using supplemental pollen with *A. swirskii* and *Euseius amissibilis* (=*E .gallicus*) and discusses current role of pollen in biocontrol strategies.

**Keywords:** biological control, predatory mites, thrips, cucumber, greenhouse, pollen, alternative food

## Predation- and oviposition capacity of five generalist predatory mite species at different temperatures

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**Abstract:** The phytoseiid mites *Amblydromalus limonicus* (Garman & McGregor), *Amblyseius andersoni* (Chant), *Amblyseius swirskii* Athias-Henriot, *Neoseiulus cucumeris* (Oudemans) and *Transeius montdorensis* (Schicha) are widely used for the biological control of thrips in greenhouse crops. There is a growing demand for effective biocontrol in crops grown at relatively low temperatures such as strawberries. We investigated the predation- and oviposition capacities of these five species against first instar larvae of the western flower thrips, *Frankliniella occidentalis* (Pergande), at 14°C, 16h 16°C and 8h 10°C, 18°C and 22°C using cucumber leaf disks under laboratory conditions. The 16°C/10°C regime was chosen because it is closer to horticultural practice than constant temperatures which is most widely

used in laboratory experiments. At all temperature regimes tested, *A. limonicus* exhibited the highest predation and oviposition rates. Contrary to the expectations, *Am. andersoni*, often considered suitable at low temperatures, showed the lowest predation capacity at 14°C. The implication of the results for the improvement of biological control strategies in crops grown at low temperatures will be discussed.

**Keywords:** predation capacity, generalist predatory mites, temperatures, biological control

## Comparative life table analysis of native and commercial *Neoseiulus californicus* populations preyed on *Phytonemus pallidus fragariae* on Albion strawberry cultivar

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**Abstract:** *Neoseiulus californicus* (McGregor) *sensu* Athias-Henriot (Mesostigmata: Phytoseiidae) is an effective predatory mite used for biological control of pest mite species such as spider mites and tarsonemid mites. Comparing native and commercial populations using age-stage, two-sex life table analysis may help optimize their use in integrated pest management programs. In this study, we investigated and compared the life history traits and population parameters of native and commercial *N. californicus* populations reared on *Phytonemus pallidus fragariae* Zimmermann (Trombidiformes: Tarsonemidae), a key pest of strawberry, using the age-stage, two-sex life table. Experiments were conducted under controlled laboratory conditions (25 ± 2°C, 65 ± 5% RH, 16:8 h L:D) using the modified Munger cell technique on 3.5 cm diameter strawberry leaf discs of the Albion strawberry cultivar. Developmental durations, survival, reproduction, and life table parameters were determined for both *N. californicus* populations. The total immature developmental period was shorter in the commercial population (5.26 d) than in the native population (5.88 d). However, the adult longevity and total longevity were longer in the commercial population (23.39 d and 26.26 d, respectively) than in the native population (19.14 d and 25.03 d, respectively). Furthermore, oviposition days ($O_d$) (commercial: 14.21 d, native: 9.56 d) oviposition period ($O_p$) (commercial: 17.58 d, native: 13.18 d) and mean fecundity per female (commercial: 30.55 eggs/female, native: 23.38 eggs/female) were highest on the commercial population. On the other hand, there were no statistically significant differences between the two populations of the predatory mite in terms of the net reproductive rate ($R_0$), the intrinsic rate of increase ($r$), the finite rate of increase ($\lambda$), and the mean generation times ($T$). The study findings are crucial for enhancing biological control strategies targeting *P. p. fragariae* in strawberry farming.

**Keywords:** biological control, predatory mite, two-sex life table, demographic parameters, life history

## Behavioral and ecological response of *Amblyseius largoensis* to HIPVs from citrus red mite-infested plants

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**Abstract:** Herbivore-induced plant volatiles (HIPVs) are defensive cues synthesized and emitted by plants in response to arthropod herbivory. These compounds mediate key ecological interactions by influencing herbivore behavior and attracting natural enemies. In this study, we investigated the emission patterns of HIPVs from *Citrus reticulata* L. (Rutaceae) infested with *Panonychus citri* (McGregor) (Prostigmata: Tetranychidae) and their effects on the predatory mite *Amblyseius largoensis (Muma) (Mesostigmata: Phytoseiidae)*, under laboratory conditions. Twenty citrus plants were used, of which ten were artificially infested with red mites and ten remained uninfested as controls. Volatile organic compounds (VOCs) were collected using polydimethylsiloxane (PDMS) silicone tubes and analyzed using thermal desorption gas chromatography-mass spectrometry (TD-GCMS). Multivariate analysis conducted in R revealed a significantly higher release of specific HIPVs in infested plants, including methyl salicylate, linalool, α-farnesene, camphene, caryophyllene, 1-octen-3-ol, (E)-β-ocimene, and (3E,7E)-4,8,12-trimethyltrideca-1,3,7,11-tetraene. Y-tube olfactometer bioassays demonstrated that *A. largoensis* exhibited a significant attraction to these compounds, especially α-farnesene, caryophyllene, and methyl salicylate ($p < 0.05$). Furthermore, functional response assays showed that the presence of these HIPVs improved predator survival and enhanced prey consumption efficiency. Our findings highlight the critical ecological function of HIPVs not only in attracting natural enemies but also in improving their predation performance. The results provide strong evidence that such volatiles can be used to improve predator efficacy in citrus orchards. This work supports the development of sustainable, semiochemical-based strategies for the biological and integrated control of mite pests, especially under protected cropping systems in citrus-producing regions of China and beyond.

**Keywords:** citrus red mite, *Amblyseius largoensis*, HIPVs, biological control, IPM

## Predation capacity of *Galendromus occidentalis* and *Neoseiulus californicus* on different stages of the two-spotted spider mite, *Tetranychus urticae*

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**Abstract:** This study aimed to evaluate the predation capacity of two predatory mite species, *Galendromus occidentalis* (Nesbitt) and *Neoseiulus californicus* (McGregor), on various developmental stages (egg, larva, protonymph and adult) and densities of the two-spotted spider mite (*Tetranychus urticae* Koch) under controlled conditions (26±1 ºC, 65±5% RH, and 16:8h light:dark). Experiments were conducted using two strawberry cultivars (cv.), Camarosa (commercial) and Osmanlı (local), as host plants. Six different prey densities were used for

each developmental stage. These prey densities ranged from 5 to 40, 5 to 30, and 3 to 30 individuals for the egg, larva and protonymph, and adult female stages, respectively. The results showed that the predation capacity of both *N. californicus* and *G. occidentalis* increased significantly with higher prey densities. In general, both predators exhibited higher predation rates on the cv. Camarosa. *N. californicus* was more efficient, particularly against the adult stage of *T. urticae*, compared to *G. occidentalis*. The highest average number of consumed adults was recorded for *N. californicus* on Camarosa at 5.56 individuals/day, while *G. occidentalis* reached 5.13 individuals/day. Both predatory mite species were also effective against egg, larval, and protonymph stages, with consumption rates rising in parallel with prey density. These findings suggest that *N. californicus* and *G. occidentalis* are effective biological control agents against *T. urticae*, and their predation capacities may vary depending on the host plant cultivar and the developmental stage of the pest.

**Keywords:** *Tetranychus urticae*, *Neoseiulus californicus*, *Galendromus occidentalis*, biological control, strawberry

***SESSION 3 – Potential of non-phytoseiid predators for biological control of pests***

## Is there a place for iolinid predatory mites in biological control of pests and diseases?

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**Abstract:** Predatory mites are crucial natural enemies for biological control of a variety of important pests, such as spider mites and thrips on a wide range of crops like cucumber, pepper and ornamentals. On tomato, however, phytoseiid mites have difficulties to disperse due to the presence of glandular trichomes. Here, we explore the potential of prostigmatid predatory mites belonging to the Iolinidae. These mites are small enough to maneuver under the tomato trichomes and have demonstrated potential to control the tomato russet mite (TRM), *Aculops lycopersici* Tryon (Trombidiformes: Eriophyidae). We demonstrate that the iolinid predatory mites such as *Homeopronematus anconai* Baker and *Pronematus ubiquitus* (McGregor) (Acariformes: Iolinidae) can keep TRM under the damage threshold. Interestingly, it was observed that tomato plants with established populations of iolinids exhibited significantly reduced mildew symptoms compared to a mite-free control. Similar results on mildew control were later observed in strawberry and cucumber crops. We will discuss future prospects and research gaps regarding Iolinidae, which show potential for simultaneously controlling a mite pest and a fungal disease.

**Keywords:** Prostigmata, tomato russet mite, mildew, supplemental feeding

## *Anystis* spp. (Prostigmata: Anystidae): Versatile generalist predators with potential in biological control

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**Abstract:** *Anystis* spp., commonly known as whirligig mites, are fast-moving predatory mites belonging to the family Anystidae. Widely distributed across temperate regions, they have been observed in diverse habitats including orchards, vineyards, and agricultural fields. This review synthesizes current knowledge on the biology, ecology, and predatory behavior of *Anystis* mites, with emphasis on their potential role in integrated pest management (IPM). These mites exhibit a broad prey range, feeding on various soft-bodied arthropods such as aphids, thrips, scale insects, and spider mites, making them promising candidates for augmentative or conservation biological control. We examine their life history traits, prey preferences, environmental tolerances, and interspecific interactions, as well as challenges related to their mass rearing and field establishment. Although information on *Anystis* spp. remains relatively scarced compared to other commercial biocontrol agents, evidence suggests considerable untapped potential. This review highlights critical knowledge gaps and outlines future directions for research and implementation in sustainable pest management programs.

**Keywords:** biocontrol agent, predatory mite, *Anystis baccarum* integrated pest management, functional response, prey preference

## A predatory soil mite as potential biological control agent of the invasive *Echinothrips americanus* and *Thrips parvispinus*

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**Abstract:** Biological pest control needs to be developed for each new, invasive species. Successful control depends not only on the predator's ability to consume the pest but also on the pest's capacity to defend itself effectively. The complex antipredator behaviour of invasive thrips such as *Echinothrips americanus* and *Thrips parvispinus* is known to affect the success of biological control with predatory mites, a successful group of natural enemies, and there is therefore need to study other predator species. The use of predatory soil mites for the biocontrol of these thrips species remains poorly explored compared to the use of above-ground predators. Some soil mites have been observed climbing plants, opening the possibility for their use both above and below ground. We therefore studied the interactions of the soil mite *Rhabdocarpais consanguineus* with first and second-instar larvae of *E. americanus* and the soil dwelling prepupae and pupae of *T. parvispinus*. The predator showed little interest in preying on the

small first-instar larvae of *E. americanus*, preferring the second-instar larvae instead. Although the prepupae and pupae of *T. parvispinus* exhibited anti-predator behaviour, this defence was insufficient to prevent predation by *R. consanguineus*, which consumed a high number of pupae in a short time. Furthermore, we evaluated the predation and oviposition rates of *R. consanguineus* when offered pupae of *T. parvispinus* and found both rates to be significantly high. Our results indicate that *R. consanguineus* is a promising biological control agent for the soil-dwelling stages of *T. parvispinus*, suggesting that field releases could be an effective method for controlling it.

**Keywords:** soil mites, invasive thrips, below-ground, above-ground

***POSTER SESSION***

## Efficacy of *Neoseiulus barkeri* in the biological control of *Tetranychus urticae*

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**Abstract:** This study aimed to determine the predation capacity of the predatory mite *Neoseiulus barkeri* (Hughes) (Mesostigmata: Phytoseiidae) on all developmental stages (egg, larva, protonymph, deutonymph, and adult) of the two-spotted spider mite *Tetranychus urticae* (Prostigmata: Phytoseiidae). Experiments were conducted under controlled conditions at 25±1°C, 65±5% relative humidity, and a photoperiod of 16 hours light and 8 hours dark. For each replicate, one *N. barkeri* individual was introduced to a population of 20 *T. urticae* individuals. After a 24-hour feeding period, the number of prey consumed by each predator was recorded. All assays were carried out on a 4 cm² area of cucumber leaves. The average daily prey consumption by *N. barkeri* during the oviposition period was determined as follows: 14.59 eggs, 11.16 larvae, 10.61 protonymphs, 8.58 deutonymphs, and 5.76 adult mites.

**Keywords**: *Tetranychus urticae*; *Neoseiulus barkeri*, predatory mite, predation capacity

*This study is a part of the PhD thesis of the first author, and was supported by the Republic of Türkiye Ministry of Agriculture and Forestry General Directorate of Agricultural Research and Policies (TAGEM)*

## Influence of temperature and humidity on the life table parameters of the Citrus brown mite *Eutetranychus orientalis* (Klein) (Prostigmata: Tetranychidae)

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**Abstract:** This study aimed to determine the biological characteristics and life table parameters of the Citrus brown mite *Eutetranychus orientalis* (Klein) (Prostigmata: Tetranychidae) on

lemon (Citrus limon (L.) Burm. f. cv. Meyer) at 25 and 30 °C temperatures with 50, 70 and 90±5% relative humidity (RH). The total immature development durations of *E. orientalis* females were found to be as 12.25, 11.73, and 11.56 days at 25 °C, and 8.92, 8.83, and 8.48 days at 30 °C across the three RH levels, respectively. Adult female longevity was recorded as 11.03, 12.59, and 8.69 days at 25 °C, and 9.16, 9.63, and 10.10 days at 30 °C, under the same RH conditions. Females laid an average of 4.09, 4.03, and 3.36 eggs per day, and 34.80, 31.27, and 24.37 eggs in total, at 25 °C and RH levels of 50, 70, and 90%, respectively. At 30 °C, the corresponding values were 3.52, 3.28, and 3.21 eggs per day, and 26.40, 24.60, and 26.06 eggs in total. The intrinsic rate of increase ($r_m$) was calculated as 0.182, 0.191, and 0.174 $day^{-1}$ at 25 °C, and 0.208, 0.207, and 0.221 $day^{-1}$ at 30 °C for 50, 70, and 90% RH, respectively. The net reproductive rate ($R_o$), was determined to be 21.38, 22.85, 15.62 and 16.16, 14.94 and 15.06 ♀/♀/generation, at 25 and 30 °C temperatures, with the same humidity levels respectively. The highest mean generation time (T) of *E. orientalis* was found to be 16.78 days at 25 °C and 50% humidity, followed by 16.35 days at 70% humidity and 15.74 days at 90% humidity. At 30 °C, the mean generation time (T) under the same RH conditions were found to be 13.39, 13.08, and 12.27 days, respectively.

**Keywords:** Citrus brown mite, temperature, humidity, life table, citrus

## Predatory mites and leaf surfaces

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**Abstract**: Predatory mites of the family Phytoseiidae are among the most commonly used predators for biological thrips control in ornamental crops. However, the establishment of phytoseiid mite populations in many ornamental crops such as *Anthurium* and orchids remains a challenge. This non-establishment could be due to the glabrous leaves (no trichomes or domatia) of these crops, which lack shelters and oviposition sites for predatory mites. Artificial microhabitats based on wool fibers and attached to the leaves could help compensate for this lack. However, another hypothesis suggests that the wax coverage on the leaf surface of these plants decreases the locomotory activity of arthropods, making them impractical for predatory mites. In this study, we investigated the potential of artificial microhabitats to help predatory mites establish in hairless ornamental crops and we analysed the wax layer structure on the leaf surface of *Anthurium* plants. Our results show that the presence of artificial microhabitats does not significantly improve the establishment of phytoseiid predatory mites in hairless ornamental crops. The analysis of the wax layer at the leaf surface, still in progress, will allow us to understand whether the wax layer could be the cause of the poor establishment of predatory mites in these crops.

**Keywords**: predatory mites, Phytoseiidae, leaf surface, wax layer, microhabitat

## Too many names, too little clarity: the first step toward resolving *Euseius* (Mesostigmata: Phytoseiidae) chaos by synonymizing 18 species from the Oriental region

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**Abstract:** The genus *Euseius* Wainstein (Mesostigmata: Phytoseiidae) comprises generalist predatory mites that play an important role as natural enemies of important pests. However, the taxonomy of this genus remains problematic, particularly in the Oriental region, where several species have been described multiple times under different names. Duplicated species descriptions and misidentifications can lead to confusion for researchers and ultimately growers in Integrated Mite Management (IMM) programs. In this study, a new species, *Euseius planocalyx* Döker, Robin & Kaur **sp. nov.**, is described. Additionally, five previously known species (*E. amissibilis*, *E. chitradurgae*, *E. coccosocius*, *E. delhiensis*, and *E. kalimpongensis*) are redescribed, and 18 new synonymies are proposed based on detailed morphological comparisons and, where possible, examination of type materials. This taxonomic clarification helps to identify these *Euseius* species correctly for their effective use in IMM programs. Our work provides clear taxonomic resources that serve as a stable guide, supporting better decisions in mite management, especially in the Indomalayan region where these mites are abundantly found in many agricultural and natural habitats.

**Keywords:** Phytoseiidae, synonymy, taxonomy, India, biological control, Integrated mite management

## Nine new Eriophyoidea (Acari: Trombidiformes) records from Türkiye

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**Abstract**: Eriophyoidea (Acari: Trombidiformes) are obligate phytophagous mites with a global distribution, exhibiting high host specificity due to specialized morphological and biological adaptations. Recognized as the second most economically significant mite group, they impact agriculture through direct plant damage, transmission of plant viruses, and potential utility in weed biological control. As a result of faunistic studies conducted in the Kaz Dağları (Mount Ida) region—a biodiversity-rich area located within the Çanakkale and Balıkesir provinces in western Türkiye, nine eriophyoid mite species, previously undocumented in the fauna of Türkiye, have been identified. The newly recorded species are as follows: From *Alnus glutinosa* (L.) Gaertn. (Betulaceae); *Acalitus brevitarsus* (Fockeu), *Acaricalus trinotus* (Nalepa), *Phyllocoptes alniincanae* Roivainen, and *Tegonotus trouessarti* Nalepa. From *Abies*

*nordmanniana* subsp. *equi-trojani* (Asch. & Sint. ex Boiss.) Coode & Cullen (Pinaceae), *Cupacarus octogibbus* Lewandowski, 2014 and *Nalepella shevtchenkoi* Boczek, 1969. From *Quercus spp.* (Fagaceae), *Aceria querci* (Garman), from *Quercus cerris* L. (Fagaceae), *A. cerrigemmarum* (Nalepa), and from *Fagus orientalis* Lipsky (Fagaceae), *A. hagleyensis* Manson. This study significantly expands the known diversity of Eriophyoidea in Türkiye and underscores the ecological importance of the Kaz Dağları region.

**Keywords:** Eriophyoid mites, species diversity, Kaz Dağları, new faunistic records, forest habitats

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## Friend or foe? The hidden threat of "*reduced-risk*" pesticides to *Euseius scutalis* (Athias-Henriot) (Parasitiformes: Phytoseiidae)

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**Abstract:** *Euseius scutalis* (Athias-Henriot) is one of the most abundant predatory mites found in citrus orchards across various parts of the Mediterranean region. Despite its abundance, limited information is available regarding the compatibility of reduced-risk pesticides with this species. This study evaluated the toxic effects of six commonly used reduced-risk pesticides: fosetyl-Al, prothioconazole + spiroxamine, proquinazid, tebuconazole, spinetoram and spinosad on adult females of *E. scutalis* under laboratory conditions. The pesticides were applied at their maximum recommended concentrations to simulate a worst-case scenario. At 120 hours post-treatment, the insecticides spinetoram and spinosad caused 100% mortality. The fungicide prothioconazole + spiroxamine also exhibited considerable toxicity with 74% mortality. In contrast, fosetyl-Al, proquinazid and tebuconazole caused lower mortality rates of 47%, 52% and 59%, respectively, with no significant differences among them. All treatments resulted in mortality rates significantly higher than the control group. In addition to mortality, egg production was also affected by the pesticide treatments. No eggs were laid by predatory mites exposed to spinetoram and spinosad at 120 hours after application. Similarly, the prothioconazole + spiroxamine treatment significantly reduced egg production showing no statistical difference from the insecticides. In contrast, fosetyl-Al, proquinazid and tebuconazole treatments resulted in egg production levels similar to the control group indicating low to moderate reproductive toxicity. These findings suggest that while spinetoram, spinosad and prothioconazole + spiroxamine exhibit high toxicity and may be incompatible with *E. scutalis* in integrated pest management programs, the moderate toxicity of fosetyl-Al, proquinazid and tebuconazole could allow their safer use in combination with this predator. However, further semi-field and field studies are necessary to confirm these laboratory results

**Keywords:** predatory mites, fungicide, insecticide, side effects, integrated mite management

## Comparative toxicity of dimpropyridaz on *Tetranychus urticae* Koch (Prostigmata: Tetranychidae) and *Phytoseiulus persimilis* Athias-Henriot (Mesostigmata: Phytoseiidae)

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**Abstract:** In the greenhouse, during the production of vegetables, there are many pest species that cause economic losses. Some of them are whiteflies, aphids, thrips and spider mites. Dimpropyridaz is a new generation insecticide developed against piercing-sucking species such as whiteflies, aphids, and thrips. The two-spotted spider mite, *Tetranychus urticae* Koch, is a phytophagous pest that can cause significant economic losses in many agricultural crops including fruit, cotton, vegetables and ornamentals. *Phytoseiulus persimilis* Athias-Henriot is a commercially available predator used to control *T. urticae* populations. The acaricidal effect of dimpropyridaz on eggs, larvae and adults of *T. urticae* and its side effect on *P. persimilis* were investigated by spray tower-disk method. The highest field application dose of dimpropyridaz was 125 ml/100 L water. Dimpropyridaz caused 0, 1.28 and 1.04% mortality of *P. persimilis* eggs, larvae and adults, respectively, while mortality of *T. urticae* eggs, larvae and adults was 0, 28, and 30.1%, respectively.

**Keywords**: *Tetranychus urticae*, *Phytoseiulus persimilis*, dimpropyridaz, IPM

## Spinosyns as acaricides: contrasting results to consider

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**Abstract:** Spinosyns (spinosad and spinetoram) are fermentation-derived products of the actinomycete *Saccharopolyspora spinosa* developed to control a broad range of insect pests. There have been contrasting reports of their acaricidal activity. In laboratory bioassays with *Tetranychus urticae*, (Acariformes: Tetranychidae) spinosyns caused significant mortality over a broad range of concentrations, with spinetoram proving more toxic than spinosad. Laboratory bioassays with predatory mites (Parasitiformes: Phytoseiidae), in which the recommended rates of spinosyns were applied, showed mortality dependent on the strain/species of mites, as well as on the application method. Most of studies on acaricidal effects of spinosyns have been performed in the laboratory. More field studies, taking into account spray coverage, persistence, population dynamics and other factors, are needed to fully understand acaricidal impact of spinosyns.

**Keywords:** spinosad, spinetoram, Tetranychidae, Phytoseiidae

## Acaricidal activities of new potential oxadiazole derivatives on *Tetranychus urticae* Koch (Prostigmata: Tetranychidae)

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**Abstract:** *Tetranychus urticae* Koch (Prostigmata: Tetranychidae) is a cosmopolitan species that causes serious losses on most agricultural crops worldwide. Although chemical control is generally used, it has been reported to be resistant to most active ingredients due to its characteristics such as rapid reproduction capacity. One of the methods to prevent this problem is the discovery of new active ingredient groups. However, the discovery of new active ingredients has significant disadvantages in terms of cost and time. This situation has led researchers to make modifications to existing active ingredients. Etoxazole is an active substance that has been reported to be effective against some important harmful mite species. For this reason, derivatization studies are being carried out with various substances. Since oxadiazoles are a group whose chemical structures can be modified, the number of studies on them is increasing. In this study, the target molecules connected to the oxidazole group were designed by replacing the oxazoline ring with oxadiazole using the bioisosterism approach and adding substituted phenyl rings to the C-2 and C-4 positions of the ring. The resulting active ingredients were applied to the egg and nymphal stages of *T. urticae*. When the toxic effects of the seven active ingredients (3a, 3b, 3c, 3d, 3e, 3f, 3g) on the nymphal stages of *T. urticae* were examined, the highest toxic effects were recorded as 66%, 64% and 58% at the highest doses of active substances 3b, 3a and 3g, respectively, after the etoxazole-treated control group. When the toxic effects on the egg stage were examined, it was determined that while group 3a showed a similar toxic effect, the other active substances showed relatively lower toxic effects. As a result, the presence of derivatives of compounds related to the oxidazole group that are effective at different stages of *T. urticae* appears to be a promising approach in the control of this pest.
**Keywords:** *Tetranychus urticae*, etoxazole, oxadiazole, acaricide

## First results of planned sampling of soil predatory mites in Slovenia

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**Abstract:** In Slovenia, in agricultural practice, only natural enemies from the List of native biological control agents (List) can be used to control plant pests. The List, which is an integral part of the Regulations on Biological Control (Official Gazette of the Republic of Slovenia, No.

45/2006), currently contains 38 species of predators, parasitoids and entomopathogenic nematodes. Among the 19 predatory species on the List, there is not yet a single species of soil predatory mites, although three of them (*Macrocheles robustulus*, *Gaeolaelaps aculeifer*, and *Stratiolaelaps scimitus*) are part of the EPPO positive list, which, in addition to the species being native, is the second condition for inclusion on the List. Therefore, in 2024, we began systematic sampling of organic substrates (especially stable manure), which represent an important habitat for soil predatory mites that prey on nematodes and other microinvertebrates. The main objective of the research was to determine the nativeness of any of the three species of soil predatory mites from the EPPO positive list, thus enabling their implementation in biological control of soil insect and mite pests. In this paper we present the results of a sampling of soil predatory mites, listing 21 species from nine families. The highest number of recorded species were from the families Macrochelidae (6), Parasitidae (4) and Urodinychidae (3). In the first year of the survey, we did not confirm the occurrence of any of the three species of soil predatory mites from the EPPO positive list.

**Keywords:** biological control, EPPO positive list, survey, autochtonous species, organic substrate, Macrochelidae

## Population density of *Tetranychus urticae* and its predators in eggplant fields in Diyarbakır, Türkiye

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**Abstract:** This study was conducted in a controlled eggplant field in Diyarbakır during 2018-2019. The aim was to investigate the population dynamics of the two-spotted spider mite, *Tetranychus urticae* Koch (Prostigmata: Tetranychidae) and its natural enemies on eggplants. The eggplant varieties used were Adana Topağı, Aydın Siyahı, Kemer, and Bismil Yuvacık. Weekly counts over two years revealed that in 2018, the highest number of mites was recorded on July 25th on the Aydın Siyahı variety, with 135 individuals. The total highest mite population throughout the season was observed in the Kemer variety with 546 individuals, followed by Adana Topağı (502 individuals), Aydın Siyahı (406 individuals), and Bismil Yuvacık (273 individuals). The lowest population was observed in the Bismil Yuvacık variety, with a maximum of 78 mites counted during the season. In 2019, the highest mite number was recorded on July 18th in the Kemer variety, with 42 individuals. The lowest population was found in the Aydın Siyahı variety, with a maximum of 18 mites recorded on August 15th and October 21st. An increase in *T. urticae* populations was observed with rising temperatures and decreasing humidity. Weekly mite counts per 10 leaves in 2019 were as follows: 292 in Kemer, 2 in Adana Topağı, 186 in Bismil Yuvacık, and 150 in Aydın Siyahı. In 2018, the populations of key predators such as *Deraeocoris* spp. (Heteroptera: Miridae), *Orius* spp. (Heteroptera: Anthocoridae), and *Stethorus gilvifrons* (Coleoptera: Coccinellidae) were examined. Predator numbers increased from September onwards in the Bismil Yuvacık variety, coinciding with a marked decrease in mite populations. In the Aydın Siyahı variety, mite populations peaked in July, followed by an increase in predator populations and a subsequent decline in mite numbers. Similar trends were observed in the Kemer variety, where an increase in predators led to a reduction in mite populations. In the Adana Topağı variety, predators suppressed the pest population in July. In 2019, populations of important predators associated with pests, including

*Campylomma* spp. (Heteroptera: Miridae), *Deraeocoris* spp., and *S. gilvifrons*, were studied. An increase in predator numbers from September onwards was noted in Bismil Yuvacık, accompanied by a significant decrease in pest populations. The *Tetranychus urticae* population generally remained low in the Aydın Siyahı variety. Predators increased and controlled the pest when the pest density reached approximately 0.2 mites per leaf. In the Kemer variety, predator numbers were very low at the pest population peak; however, predator populations increased after August, suppressing the pests. In the Adana Topağı variety, pest and predator populations fluctuated at similar levels throughout the season. Across all varieties, pest populations were absent from late September to October, coinciding with decreased temperatures and increased humidity. As a result of the study, it was determined that *S. gilvifrons* was found in greater numbers than other predators in all eggplant varieties. Predatory mites were observed in very limited numbers and irregular intervals throughout the study period.

**Keywords**: Diyarbakır, *Tetranychus urticae*, predator, mite, population dynamic

*This study is a part of the PhD thesis of the first author, and was supported by the Republic of Türkiye Ministry of Agriculture and Forestry General Directorate of Agricultural Research and Policies (TAGEM)*

## Ecological patterns and biome-specific associations of plant-inhabiting mite communities (Arachnida: Acariformes, Parasitiformes) in Brazilian biomes

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**Abstract:** Plant-inhabiting mite communities are shaped by vegetation structure and are often associated with specific biomes. In this study, we conducted the first comprehensive analysis of these communities across Brazil's six biomes, based on 183 scientific publications. A total of 524 mite species from 47 families were recorded. The Atlantic Forest showed the highest estimated richness and sampling effort, with *Euseius citrifolius* (Phytoseiidae) being the most frequently reported species. While no significant differences in species composition were detected among biomes, 55 species showed strong associations with specific biomes. The Amazon, despite its high ecological complexity, was notably under-sampled, likely leading to an underestimation of its mite diversity. These results reveal critical knowledge gaps and emphasize the importance of expanding research efforts to better understand the ecological patterns and biodiversity of mites in underexplored Brazilian biomes.

**Keywords:** Acari, community structure, endemic species, phytogeographic domain, phytophysiognomy

## Diversity of mite species in vegetable-growing areas of Diyarbakır, Elazığ, and Muş Provinces, Türkiye

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**Abstract**: This study was conducted to identify plant-feeding mite species and their natural predators in the provinces of Diyarbakır (districts of Bismil, Çermik, Çınar, Eğil, Ergani, Sur, and Yenişehir), Elazığ (districts of Baskil, Maden, Sivrice, and Central), and Muş (districts of Hasköy, Korkut, and Central) between 2018 and 2020. Sampling was carried out on the following host plant species: *Capsicum annuum* L., *Solanum melongena* L., *Solanum lycopersicum* L. (Solanaceae), *Cucumis sativus* L., *C. melo* L., *Cucurbita pepo* L., *Citrullus lanatus* (Thunb.) Matsum. & Nakai (Cucurbitaceae) and *Phaseolus vulgaris* (Fabaceae). The survey revealed the presence of several mite species and their predators. Predatory mites from the Phytoseiidae family included *Typhlodromus* (*Anthoseius*) *bagdasarjani* Wainstein and Arutunjan, *T.* (*A.*) *rhenanus* (Oudemans), *T.* (*A.*) *recki* Wainstein, *Neoseiulus barkeri* (Hughes), *N. bicaudus* (Wainstein), *N. marginatus* (Wainstein), *N. zwoelferi* (Dosse), *N. aristotelisi* Papadoulis, Emmanouel & Kapaxidi, *Phytoseius finitimus* Ribaga, and *Proprioseiopsis messor* (Wainstein). Members of the Erythraeidae family included *Abrolophus* spp., *Leptus* spp., *Erythraeus* (*Erythraeus*) sp., *Erythraeus* (*Zaracarus*) sp., and *Hauptmannia* sp. Pest mites from the Tetranychidae family were identified as *Tetranychus urticae* Koch, *T. turkestani* (Ugarov & Nikolskii), and *T. evansi* Baker & Pritchard. Additionally, one species from the Cheyletidae and Iolinidae families, *Neopronematus neglectus* (Kuznetzov), was recorded. The Tarsenomidae family was represented by *Tarsonemus waitei* Banks, the Acaridae family by *Tyrophagus perniciosus* Zakhvatkin and the Nanorchestidae family by *Speleorchestes* sp.. Due to the COVID-19 pandemic, the identification of some species from the families Ameroseiidae, Tydeidae, Stigmaeidae, Parasitidae, Bdellidae, Bryobinae, Eriophyidae, and Cunaxidae could not be completed.

**Keywords:** Diyarbakir, Muş, Elazığ, Phytoseiidae, biological control, mite

*This study is a part of the PhD thesis of the first author, and was supported by the Republic of Türkiye Ministry of Agriculture and Forestry General Directorate of Agricultural Research and Policies (TAGEM)*

## Effectiveness of the indigenous predatory mite *Amblyseius andersoni* in suppressing tomato pests under laboratory conditions

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**Abstract:** A population of the indigenous predatory mite *Amblyseius andersoni* collected from

a tomato field, was evaluated for its potential as a biological control agent against major tomato pests under controlled laboratory conditions. The predator exhibited a broad prey range, with high daily consumption rates, particularly on *Aculops lycopersici*, substantial feeding on *Tetranychus urticae* and *Frankliniella occidentalis*, and to a lesser extent, on *Bemisia tabaci*. Short-term bioassays showed that this population of *A. andersoni* exhibits high survival and oviposition rates when feeding on these pests. When the mite's diet was supplemented with *Typha angustifolia* pollen, prey consumption was significantly decreased. However, this effect was accompanied by an increase in oviposition and adult survival, highlighting the role of pollen as a supplementary food source in enhancing the predator's persistence and reproductive output. Based on these results, *A. andersoni* appears to be a promising candidate for integrated pest management (IPM) programs in tomato crops.

**Keywords:** biological control, *Amblyseius andersoni*, phytoseiids, tomato

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***SESSION 4 – Ecological complexities and Integrated Mite Management strategies***

## Epidemiological crossroads: Tomato russet mite, ToFBV, and the escalating stakes for integrated pest and disease management in tomato cropping systems

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**Abstract**: The evidence of *Aculops lycopersici* (Tryon) (Trombidiformes: Eriophyoidea; Tomato Russet Mite, TRM) ability to acquire and transmit a kitavirus (tomato fruit blotch virus - ToFBV (*Blunervirus solani*)), from and to tomato plants (*Solanum lycopersicum* L.) was confirmed. Viruliferous TRM are able to infect plant at various stages, causing symptoms like mild mosaic patterns, chlorotic spots, and discoloration, that are all directly attributed to ToFBV. While tomato provided optimal conditions for TRM development and survival, black nightshade (*Solanum nigrum* L.) nonetheless facilitated robust fecundity and a female-biased sex ratio, validating its capacity as a support host. Crucially, TRM populations exhibited high ecological plasticity, transferring between tomato and black nightshade without measurable fitness costs. Beyond these primary hosts, field bindweed (*Convolvulus arvensis* L.) sustained TRM population growth rates comparable to tomato and black nightshade, with white goosefoot (*Chenopodium album* L.) offering only short-term viability. These findings underscore black nightshade's profound significance as a critical reservoir host, functioning as a "green bridge" for TRM persistence when tomato crops are absent. Consequently, effective TRM management necessitates the incorporation of rigorous weed control, particularly targeting *S. nigrum*, to interrupt the pest's continuous life cycle and mitigate its substantial economic impact on tomato

cultivation, especially in areas like Italy where mild winters prolong mite activity. The virus-mite association increases the trouble in control combining critical steps due both to TRM damage and ToFBV-disease spreading. Particularly, the further characterization of mite transmission efficiency can support an effective disease management to limit this serious threat to tomato crops globally.

**Keywords**: tomato pest, tomato disease, integrated control, TRM vectoring virus, *Blunervirus solani*, *Solanum lycopersicum*, alternative hosts

## Evaluating different tomato cultivars for their effects on mite pests of tomato

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**Abstract:** Plants possess a range of defensive strategies to protect themselves from herbivorous arthropods. These defenses, both chemical and mechanical, vary across species and cultivars, leading to different levels of resistance against specific pest species. Moreover, herbivores can respond differently to plant defenses depending on their biological traits, such as feeding mode or their ability to tolerate or circumvent plant resistance mechanisms. In this study, we evaluated different tomato (*Solanum lycopersicum* L.) cultivars for their effects on the performance and the behavior of two mite pests of tomato: the two-spotted spider mite *Tetranychus urticae* and the tomato russet mite *Aculops lycopersici*. Performance assays revealed variation among cultivars in their impact on each pest species, indicating cultivar-specific resistance traits. In addition, the behavior of the mites in choice tests was affected by the tomato cultivar. These findings contribute to a better understanding of cultivar-specific resistance and provide a basis for selecting tomato varieties that can support more effective and sustainable pest management approaches.

**Keywords:** plant resistance, spider mites, tomato, tomato russet mite

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## Interactions between *Amblyseius swirskii* and *Euseius scutalis* co-occurring in citrus ecosystems of the eastern Mediterranean region, Türkiye

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**Abstract:** Intraguild interactions among natural enemies may significantly influence the success of biological control. The citrus brown mite, *Eutetranychus orientalis* is a major pest of citrus crops in the eastern Mediterranean region of Türkiye, where the native phytoseiid mites *Amblyseius swirskii* and *Euseius scutalis* co-occur in association with this pest. This study assessed intraguild interactions between these two species and their impact on the biological control of *E. orientalis*. Laboratory assays revealed that both predators preferred heterospecific larvae over conspecifics, indicating limited cannibalism but strong intraguild predation. Greenhouse experiments were conducted in spring and autumn to evaluate the efficacy of single and combined predator releases on potted lemon plants. *A. swirskii* alone achieved full suppression of the pest population in spring, whereas *E. scutalis* showed lower and less consistent performance. In autumn, the combined release of both species slightly reduced biocontrol efficacy compared to *A. swirskii* alone, suggesting possible interspecific competition. These findings contribute to a better understanding of predator–predator interactions and suggest the importance of careful consideration when selecting and combining natural enemies in integrated mite management programs.

**Keywords:** Integrated mite management, natural enemies, intraguild predation, cannibalism

## Sex-specific parental intraguild predation risk affects daughters' boldness in predatory mites

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**Abstract:** Animal personality describes consistent within-individual behaviours that vary among individuals across time and contexts. In addition to genetic factors, environmental factors, such as early-life experiences, have significant influences on animal personality. One of the most important environmental factors is predation risk, which can influence canonical personality traits, such as boldness, activity and exploration, in order to increase the survival chances. Several studies focused on how early-life predation risk impacts animal personality; however, whether these changes are transferred to offspring is unclear. Our study focused on sex-specific parental effects on daughters' repeatability in boldness (risk-taking) in the group-living predatory mite *Phytoseiulus persimilis*. The results revealed complex parental effects on the personalities as well as mean behavioural traits of daughters. Paternal early-life IGP experience significantly influenced mean boldness (residence in risky/benign sites) while maternal IGP experience influenced mean activity during the boldness tests. Intraclass Correlation Coefficients (ICC) revealed that the daughters' personalities in boldness (risk taking) and activity during the boldness assays were contingent upon the combination of

maternal and paternal IGP experiences. . Our research provides insights into the complexities of how environmental stressors experienced by parents can shape the behaviour of future generations, contributing to further our understanding of animal personality occurrence and evolution.

**Keywords:** arthropods, animal personality, transgenerational effects, predatory mites

## Assessing resistance to pirimicarb in different populations of *Euseius finlandicus* from Greece

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**Abstract:** Predatory mites of the family Phytoseiidae are important biological control agents of crop pests. *Euseius finlandicus* in particular is found in abundance in orchards such as cherries and peach trees, at the area of Northern Greece, experiencing heavy loads of pesticides applied against key pests. In the present study, we assessed the development of pesticide resistance in different populations of *E. finlandicus*. The research involved the collection from different regions in Northern Greece and their maintenance under laboratory conditions. Five populations were collected from different areas of Northern Greece. $LC_{50}$ values were estimated for all populations after exposing the mites to fresh leaf residues. The development of resistance to pirimicarb was confirmed for all tested populations with resistance ratios ranging from 1.1 to 3.25-fold. We discuss our results with regard to the development of pesticide resistance in *E. finlandicus* populations and the compatibility of chemical with biological control.

**Keywords:** pesticide resistance, phytoseiids, pirimicarb, $LC_{50}$s

*The study was part of the project "Innovations in Plant Protection for sustainable and environmentally friendly pest control, InnoPP - TAEDR-0535675 that is ¨Funded by the European Union- Next Generation EU, Greece 2.0 National Recovery and Resilience plan, National Flagship Initiative "Agriculture and Food Industry"*

## Physical barriers limiting *Aculops lycopersici* (Tyron) population growth on tomato

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**Abstract:** As part of the project Kretschab it was investigated, if a restriction of the population growth of the tomato russet mite *Aculops lycopersici* (Tyron) by regularly applying barriers around the plant stem is possible. As tomatoes are often grown in layer cultivation, the plants grow with one shoot throughout the season. In this setup, the stem is the main pathway for mites to move upwards to fresh plant material, while the lower leaves are typically removed. The idea of the barrier approach presented is that blocking this path will limit population growth and

consequently plant damage. Effects of the applications were monitored by counting the number of mites above the last barrier using tape imprints and the percentage of symptomatic leaves. Applications were made weekly or fortnightly using a wide range of materials. Oils and their formulations, among others, showed good performance, restricting the upwards movement of mites for several weeks in single plant trials. At the same time, some barriers showed signs of selectivity against predatory mites, as demonstrated by the ability of the model organism *Amblyseius swirskii* Athias-Henriot to cross them. Previous studies with small tomato plant plots under greenhouse conditions have shown that insect glue barriers can effectively limit damage by tomato russet mite. However, this material is not suitable for tomato growers and infestations in these trials were moderate. In the current study the rapeseed oil-based plant protection product Micula© (Evergreen Garden Care, Mainz, Germany) was tested under similar conditions. Here, with higher pest pressure, there was still an effect but it did not last the whole season. It is likely that the high pest pressure caused an increased dispersal of mites from the control to the treated plants, as the plots were randomly placed in the same greenhouse chambers. To overcome this problem and to see if the method can be applied in practice, the method will be tested on a larger crop in the current 2025 season. Full double rows with 20 plants each will be used to test different scenarios in separate greenhouse chambers: A double row treated with insect glue barriers and a double row treated with Micula® barriers in one chamber, and both treatments set up separately with an untreated control double row in the same chamber. The full set of results will be used to discuss whether Micula® barriers are as effective as insect glue barriers and whether treatments are undermined by the presence of untreated double rows within the same greenhouse. The results will also be used to discuss whether a season-long regulation of *A. lycopersici* can be expected under practical conditions.

**Keywords:** Nano-Tape, diatomaceous earth, integrated control, *Pronematus ubiquitus*

## Laboratory selection for improved tomato compatibility in phytoseiids

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**Abstract:** Tomato plants present a challenging environment for phytoseiid predatory mites due to physical and chemical barriers such as glandular trichomes, which can impede movement and reduce survival. In this study, we aimed to enhance the ability of two commercially used predatory mite species, *Phytoseiulus persimilis* and *Amblyseius andersoni*, through a process of laboratory selection. Our goal was to increase their compatibility with tomato plants and thus improve their potential for use in integrated pest management (IPM) programs. Starved adult female mites were placed on a clean tomato leaves connected by a stem 'bridge' to another leaf infested with *Tetranychus urticae*. Only individuals that successfully crossed the tomato stem bridge and reached the prey-infested leaf were retained. These survivors were used to establish the next generation, and the selection procedure was repeated across multiple generations. Our results demonstrate there is room for phytoseiid selection for increased tolerance to plant defenses under laboratory conditions. We discuss our results in relevance to the development

of more effective biocontrol agents and their integration into IPM strategies targeting difficult crop systems such as tomato.

**Keywords:** biological control, phytoseiids, plant defence, tomato

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## Compatibility of commercial tomato cultivars with the predatory mite *Phytoseiulus persimilis*

**Anastasia Pantelidou, Ioannis Bakirtzis, George D. Broufas, Maria L. Pappas**

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**Abstract:** Integrating biological control with host plant resistance offers a promising strategy for sustainable pest management. In this study, we evaluated the effects of commercially available tomato (*Solanum lycopersicum* L.) cultivars on the performance of the predatory mite *Phytoseiulus persimilis*, a key biological control agent of the two-spotted spider mite *Tetranychus urticae*. Our aim was to identify cultivars that support the predator's efficacy while exhibiting resistance traits against herbivores, thereby contributing to integrated pest management (IPM) strategies. We conducted controlled laboratory experiments to assess predator performance traits such as survival and population growth on 12 commercial tomato cultivars. We discuss our results in the context of selecting tomato cultivars that allow the integration of plant resistance and biological control to enhance the sustainability and robustness of IPM programs.

**Keywords:** IPM, phytoseiids, plant resistance, tomato

*The study was part of the project "Innovations in Plant Protection for sustainable and environmentally friendly pest control, InnoPP - TAEDR-0535675 that is ¨Funded by the European Union- Next Generation EU, Greece 2.0 National Recovery and Resilience plan, National Flagship Initiative "Agriculture and Food Industry"*

## Interactions between bulb mites (*Rhizoglyphus* sp.) and *Fusarium oxysporum* f. sp. *cepae* in Norway

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**Abstract:** Bulb mites (*Rhizoglyphus* spp.) can predispose onions to various fungal diseases. At the same time, onions infected with *Fusarium* spp. have been shown to attract bulb mites. In addition, bulb mite establishment has been shown to be more successful and population growth

faster on *Fusarium* spp. infected onions. Understanding the interactions between bulb mites and *Fusarium* spp. is essential for developing effective Integrated Pest Management (IPM) strategies targeting both *Fusarium* spp. and bulb mites. However, there is no information on the interactive effects of bulb mites and *F. oxysporum* f. sp. *cepae* on onions in Norway. Likewise, there is no prior knowledge of which bulb mite species damage onion in Norway. In the ongoing project, we study which bulb mite species exist in Norway, whether basal rot development is affected by the presence of bulb mite (*R. robini*), and whether the population growth of bulb mites is affected by *F. oxysporum* f. sp. *cepae*. We aim to present the results of the ongoing experiment and discuss their importance for the management of bulb mites and *F. oxysporum* f. sp. *cepae* in Norway.

**Keywords:** arthropod pest, basal rot, plant-feeding mites

## An integrated management approach against *T. urticae* (Prostigmata: Tetranychidae) through aqueous extracts of some botanicals and a predator, *Neoseiulus barkeri* (Mesostigmata: Phytoseiidae) in laboratory

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**Abstract:** The two-spotted spider mite, *Tetranychus urticae* Koch (Acari: Tetranychidae), is a major pest infesting numerous crops worldwide, often causing severe economic losses due to its rapid reproduction and resistance to conventional acaricides. This laboratory study aimed to develop an integrated management approach combining aqueous extracts of selected botanicals and the predatory mite *Neoseiulus barkeri* (Acari: Phytoseiidae) to control *T. urticae* effectively. Five botanicals, such as *Nicotiana tabacum*, *Citrullus colocynths*, *Allium sativum*, *Eucalyptus globulus* and *Moringa oleifera* were tested at four different concentrations (16%, 8%, 4%, and 2%) using leaf dip method on *Solanum melongena* leaf discs (1 inch²) infested with 15 individuals each of deutonymphs, tritonymphs and adults. Mortality was recorded at 24, 48, 72, and 96 hours' post-treatment and corrected using Abbott's formula. A 16% aqueous extract of *N. tabacum* resulted in the highest percent mortalities at 96 hours, with mean values of 89.20±0.681% for deutonymphs, 85.90±0.379% for tritonymphs, and 78.93±0.233% for adults. *A. sativum* aqueous extract also exhibited substantial efficacy with mean corrected mortalities of 84.30±0.436% (deutonymphs), 79.87±0.186% (tritonymphs), and 73.43±0.233% (adults) at 16% concentration. Lower concentrations and botanicals such as *E. globulus* and *M. oleifera* resulted in moderate mean percent mortalities, ranging from 57.60±0.624 to 66.57±0.353% for immature stages and from 34.40±0.115% to 52.70±0.361% for adults. Significant predatory activity was recorded for *N. barkeri*, with mean predation rates of 70.46±2.04% on deutonymphs, 66.23±1.75% on tritonymphs, and 55.07±2.6% on adults over the 96-hour observation period. These findings indicate that both botanical extracts along with predatory mites are more effective against immature stages than adults. Integrating botanicals with general predators can be an eco-friendly approach that will reduce reliance on synthetic acaricides. Further field studies are recommended to validate these laboratory findings under practical agroecosystem conditions.

**Keywords:** *Tetranychus urticae*, botanical, aqueous extract, corrected mortality, *N. barkeri*, predatory efficacy

**SESSION 5 – Faunistic studies regarding pests and their predators**

## Progress in molecular identification of eriophyoid mites for the purpose of virus vector identification in Slovenia

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**Abstract:** Eriophyoid mites are vectors of plant viruses from several genera including *Allexivirus*, *Emaravirus*, *Nepovirus*, *Poacevirus*, *Rymovirus*, *Trichovirus* and *Tritimovirus*. High throughput sequencing (HTS) is widely used for plant virome identification and new viruses are regularly identified in HTS datasets. Only in genus *Emaravirus* with 24 species, 17 new viruses were described in the last 10 years with additional nine tentative species described since 2020. For many emaraviruses only one vector species is known. But there is at least one exception, rose rosette virus (*Emaravirus rosae*, RRV) with two known vectors, *Phyllocoptes fructiphilus* and *P. arcani*. The vectoring ability of mites has to be confirmed by transmission studies which are time consuming and very complicated. However, to assess the potential of mite species as virus vectors, the information about virus detection in the possible vector would be informative. Since the morphological identification of mites is complicated and has to be done by a specialist, the possibility to identify the mite and detect the virus in the same sample with molecular methods is very useful. A non-destructive method that enables us to identify the mite and detect the virus, while still preserving the mite exoskeleton for potential morphological identification was already published. We introduced this method into our laboratory and used it on eriophyoids from grapevine, apple, walnut, red raspberry and tomato. In the end, we still encounter the same problem as before. Molecular identification of eriophyoid mites is still a challenge due to the very limited number of sequences in the databases. The broader research initiative would be needed to overcome this problem and enable easier mite identification.

**Keywords:** molecular identification, eriophyiod mites, virus detection, vector

*The work was financially supported by the Slovenian Research and Innovation Agency (ARIS Grant number P4-0072 and P4-0431)*

## Differences in mite species composition and populations between short-day and neutral-day strawberry cultivars

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**Abstract**: This study investigated mite species and their population dynamics in a neutral-day strawberry cultivar (cv. Albion) in Yatağan district of Muğla and a short-day strawberry cultivar (cv. Camarosa) in Sultanhisar district of Aydın, Turkiye. Differences existed in the number and species of phytophagous and predatory mites between strawberry cultivars. *Phytonemus*

*pallidus* (Tarsonemidae) was detected only in the neutral-day strawberry cultivar. Phytophagous and predatory mites were determined only from February to June in the short-day strawberry cultivar, whereas they were present all year in the neutral-day strawberry cultivar. The population of phytophagous mites was highest in April-May for the short-day strawberry cultivar and in August-September for the neutral-day strawberry cultivar. In conclusion, the variations in the species and populations of phytophagous and predatory mites between short-day and neutral-day strawberry cultivars emphasize the significance of biodiversity in integrated pest management in strawberry fields.

**Keywords:** strawberry, phytophagous mites, predatory mites

## Retesting Cecidophyinae (Eriophyoidea) monophyly using comparative mitogenomics reveals chaos in gall mite GenBank sequences

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**Abstract:** The superfamily Eriophyoidea Nalepa is an ancient lineage of highly host-specific phytoparasitic acariform mites, yet its phylogeny remains poorly resolved. This study investigates the monophyly of the subfamily Cecidophyinae (Eriophyoidea: Eriophyidae) using complete mitogenome sequences. Although traditionally considered monophyletic, Cecidophyinae was recently suggested to be non-monophyletic in a comprehensive mitogenomic study. However, our re-examination of available dataset revealed that this conclusion was based on misannotated sequences. A deeper analysis exposed wide-spread errors: 96 out of 153 publicly available Eriophyoidea mitochondrial genomes contained inaccuracies. More alarmingly, we identified identical sequences of *Cox1* and *rDNA* genes erroneously assigned to different taxa across multiple phylogenetic studies, including some cases at the subfamily level. These findings highlight a pressing issue in molecular systematics of Eriophyoidea. Researchers submitting data must prioritize accuracy in public databases, as uncorrected errors undermine future studies. We call for a systematic review of all published gall mite sequences in genomic repositories. Without prompt intervention, the growing molecular inconsistencies will severely hinder future research, to the point where including GenBank sequences in datasets will become too risky. If left unaddressed, one of GenBank's primary functions—molecular identification of taxa—will become effectively meaningless.

**Keywords:** mitogenomics, molecular biology, NCBI, Eriophyoidea, gall mites

## Predatory mite species on pistachio trees in Türkiye

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**Abstract:** This study was conducted in Gaziantep Province, Türkiye, between 2021 and 2023 to identify the predatory mite species and their population densities on pistachio trees. Samples were collected monthly from each district, and periodic sampling was conducted every ten days in two orchards to determine seasonal population dynamics. In this study, 11 species of predatory mites in six families were recorded. The most common family was Tydeidae, followed by Phytoseiidae. *Lorryia* sp. (Tydeidae) was the most abundant species. This study represents the first comprehensive research on the predatory mite fauna of pistachio trees in Türkiye and highlights the important role of predatory mites in natural biological control.

**Keywords:** Acari, Tydeidae, Phytoseiidae, population density, pistachio

*This research, which is part of the first author's Master's thesis, was supported by the Scientific Research Foundation of Ondokuz Mayis University in Samsun, Türkiye (Project number: PYO.ZRT.1904.21.015)*

## Phytoseiidae (Parasitiformes: Mesostigmata) Mites Associated with Eriophyoidea (Trombidiformes: Prostigmata) Species in Kaz Dağları (Mount Ida), Türkiye

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**Abstract**: This study investigates the ecological associations between pest Eriophyoidea (Prostigmata) mites and predatory Phytoseiidae (Mesostigmata) species in the Kaz Dağları region (Balıkesir and Çanakkale, Türkiye). Samplings were conducted on the following host plant species: *Corylus avellana* L., *Alnus glutinosa* (L.) Gaertn., *Juglans regia* L., *Malus* sp., *Fagus sylvatica* L., *Fagus orientalis* Lipsky, *Quercus* sp., *Abies nordmanniana* subsp. *equi-trojani* (Asch. & Sint. ex Boiss.) Coode & Cullen, *Sideritis trojana* Bornm. and *Styrax officinalis* L. In association with Eriophyoid mites and their host plants, the following Phytoseiidae species were identified: *Euseius finlandicus* (Oudemans); *Neoseiulella tiliarum* (Oudemans); *Paraseiulus incognitus* Wainstein & Arutunjan; *Amblyseius andersoni* (Chant); *Typhlodromus* (*Typhlodromus*) *ernesti* Ragusa & Swirski; *Typhlodromus* (*Anthoseius*) *recki* Wainstein; *Neoseiulus vasoides* (Karg); *Neoseiulus fauveli* (Athias-Henriot, 1978); *T.* (*A.*) *intercalaris* Livshitz & Kuznetsov; and unidentified species of *Paraseiulus* sp. and *Kampimodromus* sp. These predatory mites were observed on the same leaves or buds as the Eriophyoid mites, with *Kampimodromus* sp. and *E. finlandicus* being the most prevalent species observed in association with them. These findings may highlight the potential of Phytoseiidae mites as biological control agents against Eriophyoidea pests; however, this conclusion should be supported by further evidence.

**Keywords:** Eriophyoidea, Phytoseiidae, Kaz Dağları, biological control, fauna, Türkiye

*This study is a part of the PhD thesis of the first author, and was supported by the Scientificand Technological Research Council of Türkiye (TUBITAK-TOVAG, grant number 123O983)*

## Spider mites (Prostigmata: Tetranychidae) from Serbia: review and recent reports

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**Abstract:** Between 2013 and 2024, a comprehensive faunistic and taxonomic survey of spider mites (Prostigmata: Tetranychidae) was conducted across more than 1250 sampling locations in Serbia. The study revealed 18 species new to the Serbian acarofauna, nine of which (*Eotetranychus aceri*, *E. fagi*, *E. fraxini*, *E. libocedri*, *E. thujae*, *Oligonychus bicolor*, *Petrobia latens*, and *Tetranychus canadensis*) were also recorded for the first time in the Balkans, and *E. willamettei* for the first time in Europe. Ten of the newly recorded species are known pests, and severe infestations with visible damage symptoms were observed for *Eutetranychus orientalis*, *Panonychus citri*, *Tetranychus ludeni*, and *T. evansi*. These findings likely reflect the effects of climate change and increased international trade in plant materials, emphasizing the need for continued monitoring of invasive mite species.

**Keywords:** Tetranychidae, faunistic survey, invasive species, new records, spider mites, Europe

***SESSION 6 – Impacts of climate change on mites***

## Are climate warming- or management effects responsible for the low diversity of predatory mites in commercially used apple orchards?

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**Abstract:** Climate warming is a major driver responsible for the decline of arthropods. In agroecosystems, arthropods are also confronted with a second stressor: agricultural management. To evaluate the effects of both stressors on the diversity of an important species community in agriculture (plant-inhabiting mites), we sampled and identified them from extensively used apple orchards and commercial apple orchards during the growing season 2024. The climate warming effects in the apple commercial orchards were analysed by estimating the number of ice- and hot days per year from 1985 to 2024 at the apple orchard locations (Lehner et al., 2024). We measured the daily temperature fluctuations of the macroclimate and the microclimate (underside of leaves) of extensive- and commercial trees. The preliminary results indicated that (1) climate warming had reduced the number of ice days, but increased the number of hot days, (2) diversity of predatory mites in extensively used orchards is two-fold higher compared to commercial orchards, (3) the apple trees can buffer climate warming effects by lowering the daily temperature peaks under the leaves, but (4) these effects are much stronger in extensively used trees. The potential causes could be: the broader prey and non-prey food range in extensively used orchards; the species-specific sensitivity of

predatory mites to chemical pesticides; and/or the more favourable microclimate in the large trees of extensively used orchards. Although it seems that agricultural management is the main stressor responsible for the low species richness of the predatory mites in commercial apple orchards, further experiments are necessary (e.g.: the interaction of pesticide sensitivity and high temperatures) to clearly separate climate warming- from agricultural effects on mite diversity.

**Keywords:** agricultural intensification, climate change, diversity indexes, Phytoseiidae, Tetranychidae

## When it gets hot, who's on the menu? Impact of temperature on prey preference in *Amblyseius andersoni* (Acari: Phytoseiidae)

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**Abstract:** In biological control of pests, temperature variations can profoundly impact the effectiveness of natural enemies. Although the influence of temperature on the growth and development of ectothermic animals has long been known, the effect of temperature shifts on prey preference and prey consumption of predators remains unclear. In this study, we examined the prey preference and prey consumption of *Amblyseius andersoni* (Chant) on two important agricultural pests, the two-spotted spider mite (*Tetranychus urticae* Koch) and the western flower thrips (*Frankliniella occidentalis* Pergande), at five different temperatures (15, 20, 25, 30, and 35°C). The preference for *T. urticae* larvae weakened with increasing temperature; the maximum at 15°C and the minimum at 30°C. The daily consumption of *T. urticae* peaked at 25°C and dropped to its lowest at 35°C. In contrast, the highest consumption of *F. occidentalis* occurred at 30°C, while the lowest was recorded at 15°C. Moreover, we found that the prey preference of *A. andersoni* on the two prey may be related to the antipredator behavior of *F. occidentalis*. Our study highlights the importance of temperature conditions when using generalist natural enemies to control multiple pests.

**Keywords**: biological control, *Frankliniella occidentalis*, Phytoseiidae, Polyphagous predator, *Tetranychus urticae*

## Unexpected occurrence, spread and domination of citrus red mite *Panonychus citri* Mc Gregor, in apple orchards in Serbia

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**Abstract:** The citrus red mite, *Panonychus citri* (Mc Gregor) is a polyphagous and globally spread species, considered as an economically very important pest of citrus plants. In Europe, *P. citri* was found in all main citrus producing countries, like Greece, Spain and Italy causing

frequent or occasional damage in citrus plantations. Except citrus plants, this species was reported on some other hosts, mostly ornamentals. Over a five-year spider mites survey (2014-2018) in Serbia, which is not known as a citrus producing country, *P. citri* was found in more than 40 different sampling locations in whole country on nine different host plants from the family Rosaceae. In the beginning citrus red mite was found on wild fruit trees, in small gardens and crofts, and then within commercial orchards. During a next five years research from (2020-2024) we were focused on the same seven sampling locations (apple orchards) within intensive agricultural production. A heavy infestation with obvious feeding symptoms on the leaves was observed in five locations, and on this five locations *P. citri* populations were more numerous and noticeably pushed down the populations of *P. ulmi*, which were absolutely main pests within spider mites in apple orchards, until then. Populations of *P. citri* were collected from each sampling location. Samples were preserved in a 70% ethanol solution for further investigation. For morphological identification, we mounted slides in Hoyer's medium and observed under a phase contrast microscope. Species identification was performed based on the key characters. Molecular identification were performed by amplifying ITS2 and COI sequences using already designed species-specific primers. The partial ITS2 and COI sequences were compared with those of spider mites in NCBI database. The unexpected spread of *P. citri* in apple orchards in Serbia are probably caused by the intensive climate changes and global warming which bring higher temperatures and humidity on the continent than ever in last more than three decades.

**Keywords:** *Panonychus citri*, occurrence, spreading, apple orchards, Serbia

## Influence of native vegetation loss and fragmentation on mite diversity in soybean crops

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**Abstract:** Soybean, *Glycine max* (L.), is Brazil's main agricultural crop and a global leader in cultivated area and production. However, intensified cultivation has led to outbreaks of pest mites, especially phytophagous species like *Mononychellus planki*, which cause severe plant damage. Predatory mites (Phytoseiidae) are potential biological control agents. We evaluated how native vegetation loss and fragmentation affect mite richness and abundance in soybean fields within Cerrado landscapes. Between 2015 and 2017, we sampled 10 sites across Goiás and Mato Grosso do Sul, analyzing five landscape metrics at multiple spatial scales. Using GLMs and GLMMs, we recorded 7,434 mites from 14 species, with phytophagous mites being more abundant, but predatory mites showing higher species richness. Habitat loss had a stronger negative impact on the diversity of predatory mites, and in some cases reduced phytophagous mite richness, suggesting a risk of pest dominance in degraded landscapes. Our findings highlight the importance of preserving native vegetation to support natural enemies and ensure sustainability of agroecosystem.

**Keywords:** Acari, *Glicine max*, landscape, habitat losses, pest control, Phytoseiidae

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