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► **To cite this version:**

Azadeh Farazmand, Mahdi Jalaeian, Hashem Kamali, Alireza Saboori, Marie-Stéphane M.-S. Tixier, et al.. Phytoseiidae (Acari: Mesostigmata) in four provinces of Iran. *Persian Journal of Acarology*, 2023, 12 (1), pp.21-58. 10.22073/pja.v12i1.77425 . hal-03982480

HAL Id: hal-03982480

<https://institut-agro-montpellier.hal.science/hal-03982480v1>

Submitted on 10 Feb 2023

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Persian J. Acarol., 2023, Vol. 12, No. 1, pp. 21–58.
<https://doi.org/10.22073/pja.v12i1.77425>
Journal homepage: <http://www.biotaxa.org/pja>



Article

Phytoseiidae (Acari: Mesostigmata) in four provinces of Iran

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ABSTRACT

The present study reports the results of surveys carried out over a period of two years (2018 and 2020) in four provinces of Iran: Guilan, Razavi Khorasan, Mazandaran, and Sistan and Baluchestan. Twenty-three species from eight genera of Phytoseiidae have been collected, of which two species were newly recorded for Iran, namely: *Euseius gallicus* and *Proprioiseiopsis lineatus*. Three species, namely *Neoseiulus agrestis*, *Amblyseius obtusus*, *Typhlodromus (Anthoseius) haiastanius* are new records for the Guilan Province. *Neoseiulus californicus* and *Amblyseius swirskii* are new records for the Mazandaran Province while *Typhlodromus (Anthoseius) haiastanius* is a new record for the Razavi Khorasan Province. All species collected in Sistan and Baluchestan are new records for this province. The worldwide distribution and plant hosts of all collected phytoseiids during this study are provided.

KEYWORDS: *Euseius gallicus*, phytoseiids, *Proprioiseiopsis lineatus*, survey, taxonomy.

PAPER INFO.: Received: 3 October 2022, Accepted: 1 December 2022, Published: 15 January 2023

INTRODUCTION

Phytoseiid mites are all predators, with some species actively controlling phytophagous mites, thrips and whiteflies (Gerson *et al.* 2003; Zhang 2003). Members of this family can be found on various plants (Nazari *et al.* 2011; Asali Fayaz and Khanjani 2012; Hajizadeh and Nazari 2012; Tixier *et al.* 2014). This family is relatively well known in Iran. Ninety-two, 87 and 103 species have been reported by Demite *et al.* (2022), Hajizadeh and Faraji (2016) and Kazemi *et al.* (2022), respectively. In this paper, we present the results of a two-year (2018 and 2020) survey of phytoseiid mites collected on different plant families in four provinces of Iran, namely Guilan, Razavi Khorasan, Mazandaran, and Sistan and Baluchestan. The aim is to increase our knowledge about the species in

How to cite: Farazmand, A., Jalaeian, M., Kamali, H., Saboori, A., Tixier, M.-S. & Kreiter, S. (2023) Phytoseiidae (Acari: Mesostigmata) in four provinces of Iran. *Persian Journal of Acarology*, 12(1): 21–58.

the different provinces and the distribution of these beneficial mites on various plants.

MATERIAL AND METHODS

This study was conducted in 2018 and 2020 by collecting leaves from various cultivated and non-cultivated plants. Leaves were placed in plastic bags in an ice box and transferred to the laboratory. Mites were extracted from each leaf using a hairbrush (No. 0) under a stereomicroscope (Olympus, SZH-ILLB). After the mites were cleaned in Nesbitt's fluid, they were mounted on slides in Hoyer's medium (Walter and Krantz 2009). It should be noted that three species, namely *Neoseiulus marginatus* (Wainstein), *Proprioseiopsis messor* (Wainstein) and *Phytoseius corniger* Wainstein, were obtained from the soil using a Berlese funnel.

All voucher-specimens (specimens of each species) are deposited in IRIPP, in the collection of the Department of Plant Protection, College of Agriculture, Zabol University, Zabol, Iran (CZU) and in the mite collections of Montpellier SupAgro conserved in UMR CBGP INRA/ IRD/ CIRAD/ SupAgro/ University of Montpellier.

We used the concepts of Chant and McMurtry (1994, 2007) on the taxonomy of the family Phytoseiidae for identification and the world catalogue database of Demite *et al.* (2014, 2022) for distribution and information on descriptions and re-descriptions. We adopted the setal nomenclature system of Lindquist and Evans (1965) and Lindquist (1994) as adapted by Rowell *et al.* (1978) and Chant and Yoshida-Shaul (1989) for the dorsal surface and by Chant and Yoshida-Shaul (1991) for the ventral surface of Phytoseiidae.

Notations for idiosomal pore-like structures (gland pores and poroids/lyrifissures) follow Athias-Henriot (1975). Macrosetal notation (**Sge** = genual macroseta; **Sti** = tibial macroseta; **St** = tarsal macroseta) are that of Muma and Denmark (1970). Numbers of teeth on the fixed and movable cheliceral digits do not include the respective apical teeth. Setae not referred to in the results section and tables should be considered absent. All measurements are given in micrometres (μm) and presented with the mean in bold followed by the range in parenthesis. Only a few measurements of species, of which only a few measurements are mentioned in the literature, are provided in this paper. Classification of plants follows the Phylogenetic classification APG IV 2016 (Byng *et al.* 2018).

The following abbreviations are used in tables of this paper for morphological characters: **dsl** = dorsal shield length just above *j1* to just below *J5* in the middle line; **dsw** = dorsal shield width at the level of *s4* and at the level of *R1*; **stx** – **stx** = distance between anteroventral setae; **gensl** = genital shield length; **gensw post. cor.** = genital shield width at level of posterior corners; **lisl** = primary or largest inguinal sigilla (= "metapodal plate") length; **lisw** = primary or largest inguinal sigilla (= "metapodal plate") width; **sisl** = secondary or smallest inguinal sigilla (= "metapodal plate") length; **vsl** = ventrianal shield length; **gv3** – **gv3** = distance between centres of solenostomes *gv3* on the ventrianal shield; **vsw ZV2 & vsw anus** = ventrianal shield width at *ZV2* level and at paranal setae level; **scl**: calyx total length; **scw** = calyx widest width; **Fdl** = fixed digit length; **Mdl** = movable digit length; **Nb teeth Fd** = number of teeth on the fixed digit; **Nb teeth Md** = number of teeth on the movable digit; **Shaft** = length of the shaft of spermatodactyl; **toe** = length of the toe; **BCA** = Biological control agent; **aasl** = altitude above sea level; **imm.**: immature.

The following abbreviations are used in this paper for institutions: **CBGP** = Centre de Biologie pour la Gestion des Populations; **CIRAD** = Centre International de Recherche Agronomique pour le Développement; **IA** = Institut Agro; **INRAE** = Institut National de Recherche pour l'Agriculture, l'Alimentation et l'Environnement; **IRD** = Institut de Recherche pour le Développement; **UMR** = Unité Mixte de Recherche.

RESULTS AND DISCUSSION

In this study, 23 species from eight genera of Phytoseiidae were collected, among which two

species were newly recorded for Iran, namely: *Euseius gallicus* Kreiter & Tixier and *Proprioiseiopsis lineatus* (Wu & Lan). Three species, namely *Neoseiulus agrestis* (Karg), *Amblyseius obtusus* (Koch) and *Typhlodromus (Anthoseius) haiastanius* (Arutunjan) are new records for the Guilan Province. *Neoseiulus californicus* (McGregor) and *Amblyseius swirskii* Athias-Henriot are new records for the Mazandaran Province while *T. (A.) haiastanius* is also a new record for the Razavi Khorasan Province. All species collected in Sistan and Baluchestan are new records for that Province.

Subfamily Amblyseiinae Muma
Amblyseiinae Muma, 1961: 273.
Tribe Neoseiulini Chant & McMurtry, 2003: 6.
Genus Neoseiulus Hughes, 1948: 141.

***Neoseiulus agrestis* (Karg, 1960)**

Typhlodromus agrestis Karg, 1960: 449.

Amblyseius agrestis, Karg 1971: 196.

Amblyseius (Amblyseius) agrestis, Wainstein 1975: 920.

Amblyseius (Neoseiulus) agrestis, Karg 1993: 186.

Neoseiulus agrestis, Ragusa & Athias-Henriot 1983: 666; Moraes *et al.* 1986: 67, 2004: 98; Chant & McMurtry 2003: 35, 2007: 25.

Neoseiulus aequisetus (Wainstein, 1962): 146 (synonymy according to Karg 1975).

Specimens examined – two ♀♀ collected and measured. **Guilan Province** – two ♀♀, Rasht (3 m aasl, 49° 35' 33" E, 37° 16' 50.87" N), on *Phaseolus vulgaris* L. (Fabaceae) and *Urtica dioica* L. (Urticaceae), 28.VII.2020.

World distribution – Czech Republic, France, Germany, Greece, Hungary, Iran, Kazakhstan, Latvia, Moldova, The Netherlands, Portugal, Russia, Slovakia, South Africa, Spain, Switzerland, Türkiye, Ukraine, USA. Precise distribution in Iran is documented in Kazemi *et al.* (2022).

Remarks – Morphological characters and measurements of the specimens observed agree with those retrieved in the literature, especially with those from Iran (Table 1), with only some slight variations in setae length. This species is new to the Guilan Province. Khaustov *et al.* (2022) described a new species to Science, *N. neoagrestis*. The difference with *N. agrestis* is that the new species has gland *gd2*. Our specimens have no *gd2* and belong all to the species *N. agrestis*.

***Neoseiulus barkeri* Hughes, 1948**

Neoseiulus barkeri Hughes, 1948: 141; Ryu *et al.* 2001: 8; Moraes *et al.* 1986: 70, 2004: 104; Chant & McMurtry 2003: 35, 2007: 25.

Typhlodromus (Neoseiulus) barkeri, Nesbitt 1951: 35.

Typhlodromus (Typhlodromus) barkeri, Chant 1959: 63.

Amblyseius barkeri, Athias-Henriot 1961: 440; Moraes *et al.* 1989: 95.

Typhlodromus (Amblyseius) barkeri, Hughes 1961: 222.

Typhlodromus barkeri, Hirschmann 1962: 5.

Amblyseius (Amblyseius) barkeri, van der Merwe 1968: 112.

Amblyseius mckenziei Schuster & Pritchard, 1963: 268 (synonymy according to Ragusa & Athias-Henriot 1983).

Amblyseius usitatus van der Merwe, 1965: 71 (synonymy according to Ueckermann & Loots 1988).

Amblyseius oahuensis Prasad, 1968: 1518 (synonymy according to Ragusa & Athias-Henriot 1983).

Amblyseius picketti Specht, 1968: 681 (synonymy according to Ragusa & Athias-Henriot 1983).

Amblyseius mycophilus Karg, 1970: 290 (synonymy according to Ragusa & Athias-Henriot 1983).

Amblyseius masiaka Blommers & Chazeau, 1974: 308 (synonymy according to Ueckermann & Loots 1988).

Table 1. Comparisons of measurements of adult females of *Neoseiulus agrestis* collected in this study with those from the literature (localities followed by the number of specimens measured between brackets).

Characters	This study (2)	Iran (2)	South Africa (1) & holotype from Germany [1]	Spain (?)
Dsl	345–393	368 (360–375)	362 [377]	382
Dsw at s4 level	183–190	193 (190–195)	173 [182]	176
Dsw at R1 level	183	–	–	–
N° of gd	4 (gd2 missing)	4	4	4
Peritreme ext.	<i>jl</i>	<i>jl</i>	<i>jl</i>	<i>jl</i>
<i>jl</i>	16	14 (12–15)	13 [16]	16
<i>j3</i>	15	20 (19–21)	19	23–24
<i>j4</i>	15–19	18 (17–18)	16	21–22
<i>j5</i>	13–15	18 (17–18)	16	23–24
<i>j6</i>	19–20	21 (20–22)	19	21–22
<i>J2</i>	18–20	24 (23–25)	19	23–24
<i>J5</i>	13	13 (12–13)	13	12
<i>r3</i>	19–20	21 (20–21)	19	18–19
<i>R1</i>	20	21 (20–21)	19	20
<i>s4</i>	25	24 (23–25)	22 [21]	24–25
<i>S2</i>	25	23 (22–23)	22	22–23
<i>S4</i>	25	26 (24–27)	22	24
<i>S5</i>	22–23	21	19	23–24
<i>z2</i>	18–20	18 (17–18)	19	17–18
<i>z4</i>	20	21 (20–22)	19	22–23
<i>z5</i>	18–20	18 (17–18)	16	19–20
<i>Z1</i>	23–25	21 (18–23)	22 [18]	23–24
<i>Z4</i>	26–28	25 (24–26)	28 [25]	28
<i>Z5</i>	35–37	37 (34–40)	35 [31]	41–42
<i>st-st1</i>	53–55	–	–	–
<i>st2-st2</i>	68–70	–	61	–
<i>st3-st3</i>	75	–	–	–
<i>st1-st3</i>	70–73	–	61	–
<i>st4-st4</i>	70–73	–	–	–
Gensl	128	123 (120–125)	–	–
Gensw st5	70	74 (70–78)	–	–
<i>st5-st5</i>	65–66	–	57	–
Gensw post. corn.	73–75	–	–	–
Lisl	38	–	–	–
Lsiw	4	–	–	–
Sisl	14–15	–	–	–
Vsl	128–138	130 (128–131)	123	124
vsw ZV2	85–96	99 (98–100)	91	100–105
Vsw anus	83–88	–	82	–
<i>gv3-gv3</i>	34–35	–	–	–
<i>JV5</i>	38	34 (33–35)	–	–
scl	33	29 (27–30)	24	–
scw	14–20	13 (12–13)	–	–
<i>StIV</i>	50–53	51 (50–51)	44	52
Fdl, n° teeth	28–30, 3	34 (32–35), 3	30, 3	–
Mdl, n° teeth	33–34, 1	30, 1	28, 1	–

Sources of measurements – Iran: Asali Fayaz *et al.* (2011); South Africa and holotype measurements: Zannou *et al.* (2006); Spain: Ferragut *et al.* (2010); –: not provided; ?: number not given.

Specimens examined – 20 ♀♀ and two ♂♂. **Guilan Province** – one ♀, Rasht (3 m aasl, 49° 35' 33" E, 37° 16' 50.87" N), from the leaves of *Rubus idaeus* L. (Rosaceae), 28.VII.2020. **Sistan and Baluchestan Province** – 1 ♀, Konarak city, Tang village (15 m aasl, 59° 59' 14" E, 25° 32' 02" N), on *Prosopis juliflora* (Swartz) De Candolle (Fabaceae), 3.IV.2018; 2 ♀♀, Zabol city Balakhaneh village (483 m aasl, 61° 30' 13" E, 31° 03' 08" N), on *Morus* sp. (Moraceae), 10.V.2018; 1 ♀, Chahanimeh region (501 m aasl, 61° 43' 07" E, 30° 50' 39" N), on *Olea europea* L. (Oleaceae), 11.V.2018; 1 ♀, Bampur city, Rige Kaput village (526 m aasl, 60° 29' 52" E, 27° 11' 57" N), on *Ziziphus* sp. (Rhamnaceae), 18.X.2018; 2 ♀♀, Zahedan city, Kalateh Razagh Zadeh (1497 m aasl, 60° 48' 50" E, 29° 23' 28" N), on *Pinus* sp. (Pinaceae), 19.X.2018; 1 ♀, Zabol city, Agricultural Research Center (481 m aasl, 61° 29' 22" E, 31° 01' 10" N), on *Phragmites* sp. (Poaceae), 5.II.2019; 2 ♀♀, Mirjaveh city (1562 m aasl, 61° 14' 01" E, 28° 47' 03" N), on *Rosa damascena* Miller (Rosaceae), 9.II.2019; 1 ♀ and 1 ♂, Fanouj city (729 m aasl, 61° 31' 19" E, 30° 51' 13" N), on *Pistacia terebinthus* L. (Anacardiaceae), 9.IV.2019; 2 ♀♀, Sistan Dam (486 m aasl, 59° 38' 58" E, 26° 24' 44" N), on unknown weeds, 31.V.2019; 1 ♀, Niatak forest (482 m aasl, 61° 37' 15" E, 31° 07' 06" N), on unknown weeds, 2.VI.2019; 3 ♀♀, Khash city, Deh Pabid village (1777 m aasl, 60° 47' 08" E, 28° 36' 29" N), on *Prunus armeniaca* L. (Rosaceae), 1.IX.2019; 1 ♀, Zabol city, Ebrahim Abad (481 m aasl, 61° 26' 07" E, 30° 54' 53" N), on *Eucalyptus* sp. (Myrtaceae), 31.VII.2019; 1 ♀ and 1 ♂, Nimrooz city (481 m aasl, 61° 24' 40" E, 31° 07' 04" N), on *Salsola* sp. (Amaranthaceae), 8.VII.2020.

World distribution – Algeria, Argentina, Australia, Benin, Brazil, Burundi, Canary islands, Cape Verde, Chile, China, Cyprus, Egypt, England, Finland, France, Georgia, Germany, Ghana, Greece, Guinea, Hawaii, India, Iran, Israel, Italy, Ivory Coast, Japan, Jordan, Kenya, Latvia, Lebanon, Madagascar, Malawi, Mayotte island, Morocco, Mozambique, The Netherlands, New Zealand, Nigeria, Norway, Oman, Portugal, Reunion island, Rodrigues island, Russia, Saudi Arabia, Senegal, Slovenia, South Africa, South Korea, Spain, Sweden, Syria, Taiwan, Tahiti, Thailand, Tunisia, Türkiye, Ukraine, USA, West bank, Yemen. Precise distribution in Iran is documented in Kazemi *et al.* (2022).

Remarks – This species was already recorded from Guilan Province but is a new record for Sistan and Baluchestan Province. Morphological and morphometric characters fit well the numerous previous measurements already published (See for example Rahmani *et al.* 2010; Beaulieu and Beard 2018; Kreiter *et al.* 2020b).

Neoseiulus bicaudus (Wainstein, 1962)

Amblyseius bicaudus Wainstein, 1962: 146.

Typhlodromus bicaudus, Hirshmann 1962: 250.

Neoseiulus bicaudus, Moraes *et al.* 1986: 72, 2004: 108; Chant & McMurtry 2003: 23; 2007: 25.

Neoseiulus hirotai (Ehara, 1985): 119 (synonymy according to Ehara & Amano 2004).

Specimens examined – seven ♀♀ and one ♂. **Guilan Province:** 1 ♀, Rasht (3 m aasl, 49° 35' 33" E, lat. 37° 16' 50.87" N), on *Rubus idaeus* L. (Rosaceae), 28.VII.2020. **Sistan and Baluchestan Province:** 2 ♀♀, Konarak City, Zar Abad (18 m aasl, 59° 19' 42" E, lat. 25°41' 11" N), on *Mangifera indica* L. (Anacardiaceae), 14.IV.2018; 1 ♀, Zabol city Balakhaneh village (483 m aasl, 61° 30' 13" E, lat. 31° 03' 08" N), on *Morus* sp. (Moraceae), 10.V.2018; 2 ♀♀, Chabahar city, Pasabandar (25 m aasl, 61° 25' 42" E, lat. 25° 05' 45" N), on *Capparis decidua* (Forsskål) Edgeworth (Capparaceae), 20.V.2018; 1 ♀, Taftan Mountain (2083 m aasl, 61° 00' 11" E, lat. 28° 33' 37" N), from unknown weeds, 15.X.2018; 1 ♂, Mirjaveh city (1562 m aasl, 61° 14' 01" E, 28° 47' 03" N), on *Rosa damascena* Miller (Rosaceae), 9.II.2019.

World distribution – Armenia, Azerbaijan, Canada, Caucasus Region, Chile, Egypt, France, Georgia, Greece, Guinea, Hungary, Iran, Israel, Italy, Japan, Kazakhstan, Latvia, Mexico, Moldova,

Norway, Portugal, Russia, Saudi Arabia, Serbia, Slovakia, Spain, Switzerland, Syria, Tajikistan, Tunisia, Türkiye, Ukraine, USA. Precise distribution in Iran is documented in Kazemi *et al.* (2022).

Remarks – *Rubus idaeus* is a new host plant recorded for this mite. This species is already recorded from several Provinces but it is the first record of this species for Sistan and Baluchestan Province. Measurements of the specimens here observed agree very with measurements given by Rahmani *et al.* (2010) and with redescription by Kolodochka (2018). The examined specimens have seven pairs of dorsal solenostomes (*gd2* present), 6 or 7 large teeth on fixed digit of chelicera, smooth *J5* and serrated *JV5* setae which allow to distinguish them from *Neoseiulus micmac* (Chant & Hansell) (Kolodochka 2018).

Neoseiulus californicus (McGregor, 1954)

Typhlodromus californicus McGregor, 1954: 89.

Amblyseius californicus, Schuster & Pritchard 1963: 271.

Cydnodromus californicus, Athias-Henriot 1977: 64.

Amblyseius (Amblyseius) californicus, Ueckermann & Loots 1988: 150; Ehara *et al.* 1994: 126.

Neoseiulus californicus, Moraes *et al.* 1986: 73; Chant & McMurtry 2003a: 21; Moraes *et al.* 2004a: 109; Chant & McMurtry 2007: 25; Guanilo *et al.* 2008a: 27, 2008b: 19; sensu Athias-Henriot 1977, Beaulieu & Beard, 2018: 469.

Amblyseius (Neoseiulus) californicus, Ehara & Amano 1998: 33.

Typhlodromus chilensis Dosse, 1958: 55 (synonymy according to Athias-Henriot 1977).

Typhlodromus mungeri McGregor, 1954: 92 (synonymy according to Athias-Henriot 1959).

Amblyseius wearnei Schicha, 1987: 103 (synonymy according to Tixier *et al.* 2014).

This species is distributed worldwide (see below) and has been introduced in several countries for biological control issues. It is commercialised and released in various crops to control mite pests, especially *Tetranychus urticae* Koch and *Panonychus ulmi* (Koch). It is also naturally found on uncultivated plants or crops such as apple. Many studies deal with its biology. It is a Type 2 specialized predator of tetranychid mites (McMurtry *et al.* 2013). Nevertheless, it has characteristics of both specialist and generalist predatory mites (Castagnoli and Simoni 2003). It prefers to feed on spider mites (Gomez-Moya *et al.* 2009), but can also consume other mite species like tarsonemid mites [*Phytonemus pallidus* (Banks)] (Easterbrook *et al.* 2001), small insects such as thrips (Rodriguez-Reina *et al.* 1992) and even pollen when prey is unavailable (Rhodes and Liburd 2006). It can migrate from grasses to fruit trees or grapevines and vice versa (Auger *et al.* 1999). It is a specialist predator of *T. urticae* on annual plants and woody species, and of *P. ulmi* and various *Tetranychus* spp. (and perhaps eriophyid mites) on trees and less frequently on grapevines (Auger *et al.* 1999). *Neoseiulus californicus* is well known as a biological control agent sold in many countries for the management of spider mites in greenhouses but also in outdoor crops such as fruit crops in Europe. This species was recently recorded and mentioned in La Réunion and Slovenia (Kreiter *et al.* 2020a, b).

Specimen examined – one ♀. **Mazandaran Province** – one ♀, Javarem park (349 m aasl, 52° 54' 30.47" E, 36° 13' 42.44" N) on an unknown host plant, 6VIII.2018.

World distribution – Algeria, Argentina, Australia, Azores, Brazil, Canada, Canary Islands, Chile, Colombia, Cuba, Cyprus, France, Greece, Guadeloupe Island, Guatemala, Iran, Italy, Japan, La Réunion Island, Mexico, Morocco, Peru, Portugal, Senegal, Serbia, Slovenia, South Africa, South Korea, Spain, Syria, Taiwan, Tunisia, Türkiye, Uruguay, USA, Venezuela, Vietnam. Precise distribution in Iran is documented in Kazemi *et al.* (2022).

Remarks – *Neoseiulus californicus* is already recorded in Iran but was not reported for Mazandaran Province. The description and measurements of the adult females collected agree with those provided by Tixier *et al.* (2008) for specimens of the world, by Ferragut *et al.* (2010) for

specimens from Spain and by Kreiter *et al.* (2020b) for specimens from La Réunion and various other regions in the world.

Neoseiulus imbricatus (Corpuz & Rimando, 1966)

Amblyseius imbricatus Corpuz & Rimando, 1966: 127.

Amblyseius (*Amblyseius*) *imbricatus*, Ehara & Bhandhufalck 1977: 52.

Amblyseius (*Neoseiulus*) *imbricatus*, Gupta 1986: 114.

Neoseiulus imbricatus, Moraes *et al.* 1986: 84, 2004: 124; Chant & McMurtry 2003: 21, 2007: 29.

Neoseiulus oryzacolus Daneshvar, 1987: 18 (synonymy according to Faraji *et al.* 2007).

Specimen examined – one ♀ collected and measured. **Guilan Province** – one ♀, Rasht (3 m aasl, 49° 35' 33" E, 37° 16' 50.87" N), on *Rubus idaeus* L. (Rosaceae), 28.VII.2020.

World distribution – Azerbaijan, China, India, Iran, Philippines, Saudi Arabia, Thailand. Precise distribution in Iran is documented in Kazemi *et al.* (2022).

Remarks – This species was already recorded in Iran in Guilan Province under the name *N. oryzacolus* (Daneshvar 1987), species indicated as a junior synonym by Faraji *et al.* (2007), synonymy accepted by the present authors. Measurements of the single specimen collected agree well with previous published measurements of specimens (Table 2) from various regions of the world, especially with Iranian specimens described by Daneshvar (1987) under the name *N. oryzacolus*. After Faraji *et al.* (2007), only the number of teeth on the fixed digit is different but not well visible in our specimen to be enough sure that this number is correct. However, the dorsal gland pores *gd6* are present in the former species and absent in the latter (Daneshvar 1987; Schicha & Corpuz-Raros 1992). The presence of an additional dorsal gland pore in the genus *Neoseiulus* may correspond to two separate species or not (see Tixier *et al.* 2011). Our specimens without *gd6* are all belonging to *N. imbricatus*.

Neoseiulus marginatus (Wainstein, 1961)

Typhlodromus marginatus Wainstein, 1961: 158.

Amblyseius (*Amblyseius*) *marginatus*, Ehara 1966: 21.

Amblyseius (*Typhlodromopsis*) *marginatus*, Arutunjan 1970: 17.

Amblyseius marginatus, Kolodochka 1973: 80; Salmane 1999: 107.

Amblyseius (*Neoseiulus*) *marginatus*, Karg 1991: 21.

Neoseiulus marginatus, Moraes *et al.* 2004: 132; Chant & McMurtry 2007: 29.

Neoseiulus polyporus (Wainstein, 1962): 143 (synonymy according to Abbasova 1972).

Neoseiulus subtilisetosus (Beglyarov, 1962): 199 (synonymy according to Abbasova 1972).

Specimens examined – eight ♀♀ and one ♂. **Guilan Province** – one ♀ and one ♂, Langrud (–19 m aasl, 50° 9' 6.36" E, 37° 11' 44.36" N), in soil of fruit gardens (apple, pear and cherry) and Rasht (3 m aasl, 49° 35' 33" E, 37° 16' 50.87" N), on *Platanus* sp. (Platanaceae), 10.VII.2020. **Sistan and Baluchestan Province** – one ♀, Tang village (15 m aasl, 59° 59' 14" E, 25° 32' 02" N), on *Prosopis juliflora* (Swartz) De Candolle (Fabaceae), 2.IV.2018; 2 ♀♀, Konarak city, Kahir (29 m aasl, 60° 07' 53" E, 25° 35' 24" N), on *Citrus limon* (L.) Burman (Rutaceae), 17.IV.2018; 1 ♀, Iranshahr city (542 m aasl, 60° 38' 19" E, 27° 11' 09" N), on an unknown weeds, 14.VI.2018; 2 ♀♀, Bonjar city Abad (486 m aasl, 61° 34' 06" E, 31° 02' 08" N), on *Morus alba* L. (Moraceae), 5.V.2019; 1 ♀, Hamoon city, Mount Khajeh (482 m aasl, 50° 9' 6.36" E, 30° 57' 18" N), on an unknown weeds, 25.V.2020; 1 ♀, Hamoon city, Mohamad Abad (480 m aasl, 61° 26' 21" E, 30° 52' 05" N), on *Citrullus* sp. (Cucurbitaceae), 22.VI.2020.

World distribution – Algeria, Armenia, Azerbaijan, Belarus, Czechoslovakia, France, Georgia, Greece, Hungary, Iran, Israel, Kazakhstan, Kenya, Latvia, Moldova, Russia, Serbia, Türkiye, Turkmenistan, Ukraine.

Remarks – This species was already recorded for several Iranian Provinces and especially for Guilan Province. But it is a new record for Sistan and Baluchestan Province. The measurements of the specimens here observed agree well with those given by Rahmani *et al.* (2010) for Iranian specimens.

Table 2. Comparisons of measurements of adult females of *Neoseiulus imbricatus* collected in this study with some of those from the literature (localities followed by the number of specimens measured between brackets).

Characters	This study (1)	Iran (1)	Philippines (3)	Thailand 1 (?)	Thailand 2 (5)
Dsl	378	379	352	375 (350–385)	380
Dsw at s4 level	173	195	154	177 (172–183)	230
Dsw at R1 level	183	–	–	–	–
N° of gd	5	–	–	–	5
Peritreme ext.	<i>jl</i>	–	–	–	–
<i>j1</i>	33	27	28 (26–30)	32 (27–34)	32
<i>j3</i>	45	45	43 (44)	46 (42–50)	48
<i>j4</i>	25	22	22 (26–30)	29 (26–31)	30
<i>j5</i>	28	24	24 (26–30)	32 (30–35)	35
<i>j6</i>	38	33	39 (26–30)	46 (42–50)	48
<i>J2</i>	50	47	48 (26–30)	54 (52–57)	57
<i>J5</i>	18	14	12	14 (12–15)	14
<i>r3</i>	38	49	39 (42)	47 (44–50)	49
<i>R1</i>	48	57	45 (50)	50 (45–55)	51
<i>s4</i>	55	55	48	59 (56–61)	58
<i>S2</i>	60	55	52	61 (58–66)	61
<i>S4</i>	59	57	53	62 (56–70)	61
<i>S5</i>	51	53	55	58 (50–66)	58
<i>z2</i>	43	44	38	43 (41–49)	45
<i>z4</i>	47	47	42	51 (49–55)	50
<i>z5</i>	26	25	28 (26–30)	35 (32–37)	35
<i>Z1</i>	49	48	47	56 (54–58)	55
<i>Z4</i>	65	68	62 (66)	66 (62–71)	67
<i>Z5</i>	74	79	77 (78)	77 (70–82)	77
<i>st1–st1</i>	52	–	–	–	–
<i>st2–st2</i>	63	–	–	–	–
<i>st3–st3</i>	65	–	–	–	–
<i>st1–st3</i>	70	–	–	–	–
<i>st4–st4</i>	60	–	–	–	–
Gensl	125	–	–	–	–
<i>st5–st5</i>	83	–	79	66 (62–69)	–
Gensw post. corn.	65	–	–	–	–
Lisl	28	–	–	–	–
Lsiw	3	–	–	–	–
Sisl	?	–	11	–	–
Vsl	128	–	129	128 (112–139)	–
vsw ZV2	95	–	112	112 (108–115)	–
Vsw anus	70	–	–	–	–
<i>gv3–gv3</i>	21	–	–	–	–
<i>JV5</i>	60	–	–	–	62
scl	9	–	–	5 (5–6)	–
scw	12	–	–	11 (10–13)	–
<i>ge IV</i>	33	36	33 (30)	33 (30–36)	36
<i>ti IV</i>	38	39	35 (45)	39 (35–43)	41

Sources of measurements – **Iran:** Daneshvar (1987) but under the name *N. oryzaculus*; **Philippines:** Corpuz-Raros & Rimando (1966); **Thailand 1:** Ehara & Bhandhufalck (1977); **Thailand 2:** Oliveira *et al.* (2012); –: not provided; ?: number not given.

Table 2. Continued.

Characters	This study (1)	Iran (1)	Philippines (3)	Thailand 1 (?)	Thailand 2 (5)
<i>st IV</i>	73	73	67 (80)	80 (75–82)	76
Fdl, n° teeth	33, –	–, 10	32, 9	–	–, 8–9
Mdl, n° teeth	33, 2	–, 3	34, 3	–	–, 2

Sources of measurements – **Iran:** Daneshvar (1987) but under the name *N. oryzacolus*; **Philippines:** Corpuz-Raros & Rimando (1966); **Thailand 1:** Ehara & Bhandhufalck (1977); **Thailand 2:** Oliveira *et al.* (2012); –: not provided; ?: number not given.

Neoseiulus paspalivorus (De Leon, 1957)

Typhlodromus paspalivorus De Leon, 1957: 143.

Typhlodromus (Amblyseius) paspalivorus, Chant 1959: 79.

Amblyseius paspalivorus, Schicha 1981: 210.

Cydnodromus paspalivorus, Muma 1961: 290.

Amblyseius (Neoseiulus) paspalivorus, Ghai & Gupta 1984: 173.

Neoseiulus paspalivorus, Muma and Denmark 1970: 110; Moraes *et al.* 1986: 92, 2000: 248; Chant & McMurtry 2003: 27, 2007: 29.

Specimens examined – one ♀. **Sistan and Baluchestan Province** – one ♀, Mirjaveh city (1562 m aasl, 61° 14' 01" E, 28° 47' 03" N), on *Rosa damascena* Miller (Rosaceae), 9.II.2019.

World distribution – Benin, Brazil, Cuba, Ghana, Guadeloupe Island, India, Iran, Jamaica, Oman, Philippines, La Réunion Island, Saudi Arabia, Sri Lanka, Tunisia, USA. Precise distribution in Iran is documented in Kazemi *et al.* (2022).

Remarks – This species was already recorded from Iran but is a new record for Sistan and Baluchestan Province. The measurements of specimens collected agree well with those given by Moraes *et al.* (2000) for specimens from Carabbean Islands, by Famah-Sourassou *et al.* (2011) for specimens from Benin, Brazil and Ghana, with Kreiter *et al.* (2020b) for specimens from La Réunion and above all with redescription by Ostovan *et al.* (2012) based on an Iranian specimen.

Neoseiulus zwoelferi (Dosse, 1957)

Typhlodromus zwoelferi Dosse, 1957: 301.

Typhlodromus (Amblyseius) zwoelferi, Chant 1959b: 78.

Cydnodromus zwoelferi, Muma 1961: 290.

Amblyseius zwoelferi, Schuster & Pritchard 1963: 268.

Amblyseius (Amblyseius) zwoelferi, Wainstein 1975: 142.

Amblyseius (Neoseiulus) zwoelferi, Karg 1991: 21.

Neoseiulus zwoelferi, Moraes *et al.* 1986: 101, 2004: 152; Chant & McMurtry 2003: 23; 2007: 31, Szabó *et al.* 2013: 150.

Neoseiulus vardgesi (Arutunjan, 1968): 92 (synonymy according to Denmark & Evans 2011).

Neoseiulus zeitunicus (Wainstein & Arutunjan, 1970): 1500 (synonymy according to Wainstein 1975).

Specimens examined – six ♀♀ and one ♂, four ♀♀ measured. **Sistan and Baluchestan Province** – one ♀ and one ♂, Sistan Dam (484 m aasl, 61° 31' 20" E, 30° 55' 04" N), on unknown weeds, 3.V.2019; one ♀, Niatak Forest (482 m aasl, 61° 37' 15" E, 31° 07' 06" N), on unknown weeds, 2.VI.2019; two ♀♀, Khash city (1426 m aasl, 61°12' 18" E, 28° 12' 54" N), on *Malus domestica* Borkhausen (Rosaceae), 1.IX.2019; one ♀, Nimrooz city (480 m aasl, 61° 24' 40" E, 31°

07' 04" N), on *Salsola* sp. (Amaranthaceae), 8.VII.2020 and one ♀, on unknown weeds, 27/VIII/2019.

World distribution – Armenia, Azerbaijan, China, Finland, Germany, Greece, Hungary, Iran, Israel, Kazakhstan, Latvia, Montenegro, Norway, Russia, Slovakia, Sweden, Switzerland, Türkiye, Ukraine, USA. Precise distribution in Iran is documented in Kazemi *et al.* (2022).

Remarks – This species was recorded in most of the provinces of Iran but not in Sistan and Baluchestan. The measurements of specimens collected (Table 3) agree well with those previously given by Rahmani *et al.* (2010) and Asali Fayaz *et al.* (2011) for specimens from Iran with only some slight variations.

Table 3. Comparisons of measurements of adult females of *Neoseiulus zwoelferi* collected in this study with some of those from the literature (localities followed by the number of specimens measured between brackets).

Characters	This study (4)	Iran 1 (5)	Iran 2 (10)
Dsl	380 (363–405)	397 (390–406)	408 (400–415)
Dsw at s4 level	203 (190–215)	211 (206–219)	209 (207–210)
Dsw at R1 level	197 (180–208)	–	–
N° of gd	7	–	7
Peritreme ext.	<i>jl</i>	–	<i>jl</i>
<i>j1</i>	21 (18–23)	18 (16–18)	20 (19–20)
<i>j3</i>	26 (25–28)	23 (21–26)	26 (25–26)
<i>j4</i>	18	15 (13–16)	18 (18)
<i>j5</i>	16 (15–18)	17 (16–18)	18 (18)
<i>j6</i>	21 (19–25)	19 (18–21)	21 (21)
<i>J2</i>	21 (20–24)	18 (16–21)	24 (22–25)
<i>J5</i>	11 (10–12)	10 (9–12)	11 (10–11)
<i>r3</i>	27 (25–28)	21 (18–23)	24 (24)
<i>R1</i>	21 (15–25)	22 (21–23)	25 (25)
<i>s4</i>	33 (32–33)	27 (23–29)	31 (30–32)
<i>S2</i>	30 (28–30)	27 (26–29)	28 (26–30)
<i>S4</i>	26 (25–28)	29 (26–32)	25 (24–25)
<i>S5</i>	24 (20–27)	22 (21–23)	24 (24)
<i>z2</i>	22 (20–25)	20 (18–21)	25 (24–25)
<i>z4</i>	25 (24–25)	22 (21–23)	21 (20–21)
<i>z5</i>	19 (18–19)	17 (16–18)	19 (19)
<i>Z1</i>	23 (21–23)	21 (18–23)	23 (22–23)
<i>Z4</i>	37 (35–38)	35 (31–36)	35 (33–36)
<i>Z5</i>	48 (45–50)	52 (47–55)	50 (49–50)
<i>st1–st1</i>	57 (53–60)	–	–
<i>st2–st2</i>	70 (68–75)	–	–
<i>st3–st3</i>	77 (70–80)	–	–
<i>st1–st3</i>	75 (69–78)	–	–
<i>st4–st4</i>	81 (73–90)	–	–
Gensl	127 (113–138)	–	127 (120–135)
Gensw <i>st5</i>	74 (72–75)	–	83 (80–85)
<i>st5 –st5</i>	71 (69–73)	–	–
Gensw post. corn.	81 (78–88)	–	–
Lisl	25 (20–30)	–	–
Lsiw	6 (5–7)	–	–
Sisl	16 (15–18)	–	–
Vsl	130 (128–133)	121 (109–137)	141 (138–143)
vsw <i>ZV2</i>	110 (108–113)	108 (101–117)	116 (112–120)
Vsw anus	88 (80–93)	–	–
<i>gv3–gv3</i>	49 (45–53)	–	–
<i>JV5</i>	41 (35–47)	–	47 (43–50)
scl	30 (25–35)	8 (6–9)	22 (21–23)
scw	19 (18–21)	–	14 (12–15)
<i>GeIV</i>	33 (30–35)	–	31 (30–31)
<i>TiIV</i>	29 (28–30)	–	–

Sources of measurements – Iran 1: Rahmani *et al.* (2010); Iran 2: Asali Fayaz *et al.* (2011); –: not provided.

Table 3. Continued.

Characters	This study (4)	Iran 1 (5)	Iran 2 (10)
<i>tIV</i>	62 (50–75)	66 (62–68)	71 (66–75)
Fdl, n° teeth	32 (30–35), 3	–	35, 4
Mdl, n° teeth	34 (33–35), 0	–	32 (31–33), 0

Sources of measurements – Iran 1: Rahmani *et al.* (2010); Iran 2: Asali Fayaz *et al.* (2011); –: not provided.

Tribe Amblyseiini Muma, 1961
Amblyseiinae Muma, 1961: 273; Amblyseiini Muma, Wainstein 1962: 26.
Subtribe Amblyseiina Muma, 1961
Amblyseiina Muma, Chant & McMurtry 2004: 179.
Genus *Amblyseius* Berlese, 1914: 143.

***Amblyseius obtusus* (Koch, 1839)**

Zercon obtusus Koch, 1839: 13.

Seius obtusus, Berlese 1889: 7.

Typhlodromus obtusus, Chant 1957: 306.

Typhlodromus (Amblyseius) obtusus, Chant 1959: 90.

Amblyseius (Amblyseius) obtusus, Muma 1961: 287.

Amblyseius obtusus, Moraes *et al.* 1986: 24, 2004: 42; Chant & McMurtry 2004: 197, 2007: 80.

Amblyseius truncatus Oudemans, 1905c: 8 (synonymy according to Berlese 1918).

Amblyseius musae (Garman, 1958): 73 (synonymy according to Denmark & Evans 2011).

Amblyseius perlongisetus Berlese, 1916: 173 (synonymy according to Denmark & Evans 2011).

Amblyseius multidentatus (Chant, 1959): 84 (synonymy according to Abbasova 1972).

Amblyseius affatisetus (Wainstein, 1960): 683 (synonymy according to Wainstein 1975).

Amblyseius sellnicki (Karg, 1960): 444 (synonymy according to Denmark & Evans 2011).

Amblyseius microsetae Muma, 1961: 289 (synonymy according to Denmark & Muma 1989).

Amblyseius hamizensis Athias-Henriot, 1961: 421 (synonymy according to Wainstein 1975).

Amblyseius rabdus Denmark, 1965: 95 (synonymy according to Denmark & Muma 1989).

Amblyseius kurashvilii Gomelauri, 1968: 515 (synonymy according to Denmark & Muma 1989).

Amblyseius bajulus Chaudhri, Akbar & Rasool, 1979: 70 (synonymy according to Denmark & Muma 1989).

Specimen examined – one ♀. **Guilan province**– one ♀, Rasht (3 m aasl, 49° 35' 33" E, 37° 16' 50.87" N), on *Rubus idaeus* L. (Rosaceae), 28.VII.2020.

World distribution – Algeria, Argentina, Armenia, Azerbaijan, Azores, Canada, Chile, Costa Rica, Croatia, Cuba, Czech Republic, England, France, Germany, Georgia, Greece, Haiti, Hawaii, Hungary, Ireland, Italy, Kazakhstan, Latvia, Moldova, Morocco, New Zealand, Norway, Pakistan, Poland, Portugal, Romania, Russia, Slovakia, Spain, Sweden, Tunisia, Türkiye, Ukraine, USA, Venezuela. Precise distribution in Iran is documented in Kazemi *et al.* (2022).

Remarks – *Rubus idaeus* is a new host plant recorded for this mite in Iran. This species was already recorded from Iran but it is a new record of the Guilan Province. The measurements of specimens collected agree with those given by Döker *et al.* (2020) for specimens from Türkiye.

***Amblyseius swirskii* Athias-Henriot, 1962**

Amblyseius swirskii Athias-Henriot, 1962: 5.

Amblyseius (Amblyseius) swirskii, Ehara 1966: 23.

Typhlodromips swirskii, Moraes *et al.* 1986: 149; 2004: 227.

Amblyseius swirskii, Chant & McMurtry 2004a: 201; 2007: 81.

Amblyseius capsicum (Basha, Yousef, Ibrahim & Mostafa, 2001): 372 (synonymy according to Abo-Shnaf & Moraes 2014).

Amblyseius enab El-Badry, 1967: 178 (synonymy according to Abo-Shnaf & Moraes 2014).

Amblyseius rykei Pritchard & Baker, 1962: 249 (synonymy according to Zannou & Hanna 2011).

The predatory mite *A. swirskii* is one of the most efficient Phytoseiidae; it is currently released in more than 50 countries around the world. It originates from the eastern Mediterranean coast and was described in 1962 by Athias-Henriot on almonds [*Prunus dulcis* (Miller) Webb.] in Bet Dagan, Israel. This species was then reported along the coast of Israel, in Middle Eastern countries, in southern Europe, in sub-Saharan Africa and in the America only once in Argentina with a questionable identification (Demite *et al.* 2022). This species is able to develop not only in the Mediterranean region but also in subtropical and tropical areas (Zannou and Hanna 2011). Since this species is not entering diapause, it can be used during much of the season when daytime temperatures are regularly above 22 °C (Calvo *et al.* 2015). *Amblyseius swirskii* is widely used in Europe and North America to control whiteflies and thrips in greenhouse vegetables (especially cucumbers, peppers and eggplants) and some ornamentals (Calvo *et al.* 2015). The biology of this species and its importance for biocontrol were reviewed by Calvo *et al.* (2015) and Buitenhuis *et al.* (2015).

Specimens examined – two ♀♀ and one ♂. **Mazandaran province** – one ♀ and one ♂, Javarem park (349 m aasl, 52° 54' 30.47" E, 36° 13' 42.44" N), on *Ficus carica* L. (Moraceae), 6.VIII.2018; one ♀, Alasht (1720 m aasl, 52° 50' 14.974" E, 36° 4' 6.473" N), on an unknown plant (Apiaceae), 7.VIII.2018.

World distribution – Argentina, Azerbaijan, Benin, Burundi, Cape Verde, Cuba, Dr Congo, Egypt, Gaza Strip, Georgia, Ghana, Iran, Israel, Italy, Kenya, La Réunion Island, Malawi, Nigeria, Saudi Arabia, Senegal, Slovenia, Spain, Syria, Tanzania, Türkiye, USA, Yemen, Zimbabwe. Precise distribution in Iran is documented in Kazemi *et al.* (2022).

Remarks – This species was already recorded in Iran (Kazemi *et al.* 2022) but is a new record for Mazandaran Province. The description and measurements of the adult females collected agree with those provided by Ferragut *et al.* (2010) for specimens from Spain and by Kreiter *et al.* (2016a, b) for specimens from La Réunion and various other countries. Just like emphasized in these last papers for La Réunion (previous surveys have not mentioned that species), this species was not native to Iran and possibly escaped to the field after being used in the greenhouses against whiteflies and thrips.

Genus *Transeius* Chant & McMurtry, 2004: 181.

***Transeius wainsteini* (Gomelaury, 1968)**

Amblyseius wainsteini Gomelaury, 1968: 518.

Amblyseius (Amblyseius) wainsteini, Wainstein & Vartapetov 1973: 103.

Typhlodromips wainsteini, Moraes *et al.* 1986: 148, 2004: 225.

Transeius wainsteini, Chant & McMurtry 2004: 185, 2007: 71.

Transeius caspiensis (Daneshvar & Denmark, 1982): 5 (synonymy according to Rahmani *et al.* 2010).

Transeius patellae (Karg, 1982): 204 (synonymy according to Rahmani *et al.* 2010).

Specimens examined – 13 ♀♀ and two ♂♂, five ♀♀ measured. **Guilan Province** – seven ♀♀ and one ♂, Rasht (3 m aasl, 49° 35' 33" E, 37° 16' 50.87" N), on *Citrus sinensis* (L.) Osbeck (Rutaceae) and one ♀, 10.VII.2020. **Mazandaran Province** – one ♀ and one ♂, Javarem park (349

m aasl, 52° 54' 30.47" E, 36° 13' 42.44" N), on *Ficus carica* L. (Moraceae) and one ♀, on *Fagus* sp. (Fagaceae), 6.VIII.2018; 4 ♀♀, Alasht (1720 m aasl, 52° 50' 14.974" E, 36° 4' 6.473" N), on *Pterocarya fraxinifolia* Spach (Juglandaceae), 7.VII.2018.

World distribution – Czechoslovakia, Denmark, Georgia, Germany, Iran, Poland, Russia, Slovakia, Türkiye. Precise distribution in Iran is documented in Kazemi *et al.* (2022).

Remarks – *Fagus* sp. is a new host plant recorded for this species in Iran. *Transeius wainsteini* was already recorded in many regions of Iran and especially from both provinces investigated in this study. Morphological and morphometric characters (Table 4) fit previous measurements published especially with those provided by Tixier *et al.* (2021) except for macrosetae on genual III and IV of specimens from Iran much longer in Rahmani *et al.* (2010) for *SgeIV* and *StiIV* and the number of teeth on the fixed digit of specimens from Türkiye which is of 9 instead of 8 in our specimens (Faraji *et al.* 2011).

Table 4. Comparisons of measurements of adult females of *Transeius wainsteini* collected in this study with some of those from the literature (localities followed by the number of specimens measured between brackets).

Characters	This study (5)	Georgia (10)	Germany (?)	Iran (5)	Türkiye (3)
Dsl	333 (313–353)	362 (340–382)	365– 380	377 (365–384)	344 (338–350)
Dsw at s4 level	192 (183–203)	170 (155–177)	230– 240	226 (220–229)	210 (205–215)
Dsw at R1 level	193 (160–205)	–	–	–	–
N° of gd	7	7	–	–	7
Peritreme ext.	<i>jl</i>	<i>jl</i>	–	–	<i>jl</i>
<i>j1</i>	27 (25–29)	26 (22–30)	53	23 (21–24)	30
<i>j3</i>	50 (48–51)	51 (50–55)	10	47 (45–49)	52 (50–55)
<i>j4</i>	10 (9–10)	8 (7–10)	9	8 (7–8)	11 (10–11)
<i>j5</i>	8 (6–10)	7	12	8 (7–8)	9 (8–10)
<i>j6</i>	10 (8–13)	8 (7–10)	10	8 (7–8)	11 (10–12)
<i>J2</i>	10 (9–10)	9 (7–10)	10	9 (7–10)	11
<i>J5</i>	9 (8–10)	6 (5–7)	53	8	10 (9–10)
<i>r3</i>	28 (25–30)	25 (22–27)	–	25 (22–26)	29 (28–30)
<i>R1</i>	20 (18–21)	17 (15–20)	–	15 (14–17)	22 (20–23)
<i>s4</i>	67 (63–70)	68 (65–72)	65	68 (65–70)	71 (68–73)
<i>S2</i>	30 (28–30)	27 (25–32)	34	29 (26–31)	33 (29–36)
<i>S4</i>	15	13 (12–15)	15	17 (16–18)	17 (15–18)
<i>S5</i>	14 (13–15)	9 (7–10)	–	12 (11–14)	12 (10–13)
<i>z2</i>	21 (18–25)	22 (17–27)	24	23 (22–24)	28 (25–30)
<i>z4</i>	27 (23–33)	32 (22–35)	30	32 (30–33)	35
<i>z5</i>	8 (6–8)	7 (5–7)	–	7 (7–8)	9 (8–9)
<i>Z1</i>	13 (12–13)	11 (7–12)	–	13 (11–14)	18
<i>Z4</i>	55 (53–58)	63 (60–67)	70	109 (105–112)	68 (65–70)
<i>Z5</i>	121 (118–125)	119 (110–127)	120– 140	117 (112–120)	126 (118–135)
<i>st1–st1</i>	56 (53–60)	–	–	–	–
<i>st2–st2</i>	66 (63–68)	69 (65–72)	–	–	–
<i>st3–st3</i>	77 (75–80)	–	–	–	–
<i>st1–st3</i>	62 (55–65)	65 (62–70)	–	–	–
<i>st4–st4</i>	78 (70–90)	–	–	–	–
Gensl	121 (115–130)	–	–	–	–
<i>st5 – st5</i>	64 (59–70)	67 (65–70)	–	–	77 (75–78)
Gensw post. corn.	76 (65–90)	–	–	–	–
Lisl	24 (20–25)	24 (22–25)	–	–	27 (25–28)
Lsiw	5 (4–5)	5 (4–5)	–	–	10
Sisl	13 (13–14)	10 (7–12)	–	–	–
Vsl	116 (195–125)	116 (112–125)	–	114 (107–117)	120 (110–130)
vsw ZV2	82 (75–85)	84 (80–90)	–	88 (85–90)	84 (78–90)
Vsw anus	79 (75–85)	82 (77–90)	–	–	82 (75–88)
<i>gv3–gv3</i>	21 (18–24)	–	–	–	–
<i>JV5</i>	61 (60–63)	64 (60– 70)	–	–	–
scl	7 (6– 8)	8–10	–	13 (10–16)	8
scw	12 (10–13)	5	–	–	–
<i>Sge II</i>	30	31 (30–35)	–	–	33

Sources of measurements – **Georgia:** Tixier *et al.* (2021); **Germany:** Karg (1977); **Iran:** Rahmani *et al.* (2010); **Türkiye:** Faraji *et al.* (2011); –: not provided; ?: number not known.

Table 4. Continued.

Characters	This study (5)	Georgia (10)	Germany (?)	Iran (5)	Türkiye (3)
<i>Sge III</i>	29 (28–30)	32 (30–35)	–	42 (37–47)	35
<i>Sge IV</i>	50 (43–55)	55 (52–57)	–	91 (83–94)	52 (50–53)
<i>Sti IV</i>	46 (40–50)	41 (35–40)	–	57 (54–63)	39 (38–40)
<i>St IV</i>	62 (55–68)	63 (60–70)	–	57 (55–61)	77 (75–78)
Fdl, n° teeth	29 (28–30), 8	37, –	–	–	28, 9
Mdl, n° teeth	32 (30–33), 2	32, –	–	–	33, 2

Sources of measurements – **Georgia:** Tixier *et al.* (2021); **Germany:** Karg (1977); **Iran:** Rahmani *et al.* (2010); **Türkiye:** Faraji *et al.* (2011); –: not provided; ?: number not known.

Subtribe Proprioseiopsina Chant & McMurtry, 2004: 219.
Genus Proprioseiopsis Muma 1961: 277.

***Proprioseiopsis cf. lineatus* (Wu & Lan, 1991)**

Amblyseius lineatus Wu & Lan, 1991: 316.

Amblyseius (Proprioseiopsis) lineatus, Wu *et al.* 2009: 179.

Proprioseiopsis lineatus, Moraes *et al.* 2004: 180; Chant & McMurtry 2005a: 15, 2007: 89; Liao *et al.* 2021: 648.

Specimen examined – one ♀ collected and measured. **Sistan and Baluchestan Province** – one ♀, Konarak city, Kahir (29 m aasl, 60° 07' 53" E, 25° 35' 24" N), from leaves of *Citrus limon* (L.) Burman (Rutaceae), 17.IV.2018.

World distribution – China.

Remarks – This is the first record of *P. lineatus* outside China and the first record for Iran. Morphological characters are closed to those published in the original description by Wu and Lan (1991). All measurements fit quite well with previously published measurements except for some shorter (*JV5*, *Sti IV*, *StIV*) and some longer setae (*z4*, *r3*, *s4*, *S5*) published (Table 5). However, we have collected only one individual and previous measurements were also made on probably few specimens. It means that the overall variability remains almost totally unknown.

Table 5. Comparisons of measurements of adult females of *Proprioseiopsis lineatus* collected in this study with some of those from the literature (localities followed by the number of specimens measured between brackets).

Characters	This study (1)	China (?)	Characters	This study (1)	China (?)
Dsl	328	380–385	<i>st2–st2</i>	65	–
Dsw at s4 level	215	225–245	<i>st3–st3</i>	70	–
Dsw at R1 level	225	–	<i>st1–st3</i>	55	–
N° of gd	7	–	<i>st4–st4</i>	68	–
Peritreme ext.	<i>j1</i>	–	Gensl	120	–
<i>j1</i>	20	23–25	<i>st5–st5</i>	73	–
<i>j3</i>	35	40–41	Gensw post.	83	–
<i>j4</i>	5	6	Lisl	19	–
<i>j5</i>	5	6–8	Lsiw	5	–
<i>j6</i>	6	8	Sisl	8	–
J5	10	8–9	Vsl	105	–
<i>r3</i>	23	19–20	vsw ZV2	103	–
R1	15	13	Vsw anus	73	–
<i>s4</i>	63	58–60	JV5	50	75–78
S2	12	10	Scl	18	–
S4	13	10	Scw	13	–
S5	23	10	Sge II	28	–

Sources of measurements – **China:** Wu & Lan (1991) and Liao *et al.* (2021); –: not provided; ?: number not given.

Table 5. Continued.

Characters	This study (1)	China (?)	Characters	This study (1)	China (?)
<i>z2</i>	20	18	<i>Sge III</i>	28	–
<i>z4</i>	18	13	<i>Sge IV</i>	60	58–60
<i>z5</i>	9	8	<i>Sti IV</i>	45	53–55
<i>Z1</i>	8	10–13	<i>St IV</i>	55	65–70
<i>Z4</i>	75	78–83	Fdl, n° teeth	23, 8	–
<i>Z5</i>	95	103	Mdl, n° teeth	26, 1	–
<i>st1–st1</i>	50	–			

Sources of measurements – China: Wu & Lan (1991) and Liao *et al.* (2021); –: not provided; ?: number not given.

Proprioiseiopsis messor (Wainstein, 1960)

Typhlodromus messor Wainstein, 1960: 688.

Amblyseius messor, Athias-Henriot 1961: 425.

Amblyseius (Amblyseius) messor, Ehara 1966: 22; Ueckermann & Loots 1988: 66.

Amblyseius (Amblyseiulus) messor, Arutunjan 1970: 16.

Proprioiseiopsis (Amblyseiulus) messor, Karg 1989: 212.

Proprioiseiopsis messor, Moraes *et al.* 1986: 117, 2004: 180; Chant & McMurtry 2005a: 15, 2007: 89.

Proprioiseiopsis apheles (van der Merwe, 1968): 121 (synonymy according to Ueckermann & Loots 1988).

Proprioiseiopsis lindquisti (Schuster & Pritchard, 1963): 246 (synonymy according to Abbasova 1972).

Specimens examined – seven ♀♀ and two ♂♂. **Guilan Province**– one ♂, Langrud (-19m aasl, 50° 9' 6.36" E, 37° 11' 44.36" N), in soil of a fruit garden (including apple, pear and cherry), 4.VIII.2020. **Sistan and Baluchestan Province** – one ♀, Chabahar city, Pasabandar (59 m aasl, 61° 25' 42" E, 25° 05' 45" N), on *Capparis decidua* (Forsskål) Edgeworth (Capparaceae), 20/V/2018; one ♀ + one ♂, Zabol city, Chahanimeh region (505 m aasl, 60° 42' 50" E, 30° 51' 00" N), on unknown weeds, 11.IV.2019; one ♀, Zabol city, University Campus (484 m aasl, 61° 32' 01" E, 31° 02' 36" N), on unknown weeds, 5.V.2019; one ♀, Jazinak city (486 m aasl, 61° 34' 15" E, 30° 52' 35" N), on unknown weeds, 2/VI/2019; three ♀♀, Golkhani Town (478 m aasl, 61° 12' 18" E, 31° 02' 21" N), on *Cressa cretica* L. (Convolvulaceae), 20/VII/2020.

World distribution – Algeria, Argentina, Armenia, Australia, Azerbaijan, Canary Islands, Egypt, France, Gaza strip, Georgia, Germany, Greece, Hungary, Iran, Israel, Italy, Latvia, Morocco, New Zealand, Portugal, Saudi Arabia, Slovakia, South Africa, Spain, Syria, Turkmenistan, Ukraine, USA. Precise distribution in Iran is documented in Kazemi *et al.* (2022).

Remarks – *Proprioiseiopsis messor* was already recorded from Iran in many Provinces but this is the first record for Sistan and Baluchestan Province. Morphological and morphometric characters fit very well the previous description and measurements published by Zaher (1986) for specimens from Egypt, Ferragut *et al.* (2010) for specimens from Spain and Abo-Shnaf, Moraes (2014) for specimens from Egypt and above all Ostovan *et al.* (2012) in a redescription based on Iranian specimens.

Proprioiseiopsis okanagensis (Chant, 1957)

Typhlodromus okanagensis Chant, 1957: 293.

Typhlodromus (Amblyseius) okanagensis, Chant 1959: 93.

Amblyseius okanagensis, Muma 1961: 478.

Amblyseius (Amblyseius) okanagensis, Van der Merwe 1968: 113.

Proprioseiopsis (Amblyseius) okanagensis, Karg 1983: 303.

Amblyseius (Proprioseiopsis) okanagensis, Wu et al. 2009: 181.

Proprioseiopsis okanagensis, Chant & McMurtry 2005a: 15; 2007: 89.

Proprioseiopsis levis Wainstein, 1960: 686 (synonymy according to Karg 1971b).

Specimens examined – three ♀♀. **Sistan and Baluchestan Province** – one ♀, Konarak city, Kahir (29 m aasl, 60° 07' 53" E, 25° 35' 24" N), on *Citrus limon* (L.) Burman (Rutaceae), 17.IV.2018; one ♀, Kalateh Razagh Zadeh (1497 m aasl, 60° 48' 50" E, 29° 23' 28" N), on *Pinus* sp. (Pinaceae), 19.X.2018; one ♀, Jazinak city (486 m aasl, 61° 34' 15" E, 39° 52' 35" N), on unknown weeds, 30.VII.2019.

World distribution – Austria, Azerbaijan, Canada, China, Czech Republic, Finland, France, Germany, Georgia, Greece, Greenland, Hungary, Iceland, Iran, Kazachstan, Latvia, Moldova, Norway, Poland, Russia, Slovakia, Slovenia, Sweden, Türkiye, Ukraine, USA. Precise distribution in Iran is documented in Kazemi et al. (2022).

Remarks – This species have been recorded in Iran but not in Sistan and Baluchestan. Morphological characters agree well with those provided in the original description. All measurements fit well previous measurements published by Chant and Hansell (1971) for specimens from Canada and by Congdon (2002) for specimens from USA except longer $z2$, $S2$, $S4$, $S5$, $JV5$ and $StIV$ and shorter $Z5$, $SgeIV$ and $StiIV$ in the specimens herein observed (Table 6). Measurements of original description are not complete but drawings are good allowing to confirm the identity of that species.

Table 6. Comparisons of measurements of adult females of *Proprioseiopsis okanagensis* collected in this study with some of those from the literature (localities followed by the number of specimens measured between brackets).

Characters	This study (2)	Canada (?)	USA (?)	Characters	This study (2)	Canada (?)	USA (?)
Dsl	330–375	–	441	st1–st1	50–58	–	–
Dsw at s4 level	220–243	–	274	st2–st2	68–78	–	80
Dsw at R1 level	240–265	–	–	st3–st3	81–85	–	–
N° of gd	7	–	–	st1–st3	60–65	–	72
Peritreme ext.	j1	–	–	st4–st4	80–85	–	–
j1	30	–	29	Gensl	113–125	–	–
j3	55–60	52	48	st5–st5	93	–	–
j4	8	–	6	Gensw post.	99–110	–	–
j5	8	–	8	Lisl	25–28	–	–
j6	15	–	14	Lsiw	4–5	–	–
J5	14	–	11	Sisl	11–14	–	–
r3	33–35	–	36	Vsl	118–143	180	150
R1	23–25	–	22	vsw ZV2	131–133	126	149
s4	85–88	82	82	Vsw anus	85–88	–	96
S2	53–68	40	43	JV5	60–75	–	58
S4	43–50	–	17	scl	30	–	14
S5	28–38	–	17	Sge III	Not possible to	–	29
z2	48–50	36	35	Sge IV	33–50	–	54
z4	55	62	55	Sti IV	30–38	–	48
z5	8–12	–	7	St IV	90–100	–	72
Z1	35–40	18	23	Fdl, n° teeth	23–25, not	–	29, 3
Z4	73–80	80	82	Mdl, n°	28–30, 1	–	34, 1
Z5	73–80	106	108				

Sources of measurements – **Canada:** Chant & Hansell (1971); **USA:** Congdon (2002); –: not provided; ?: number not given.

Tribe Euseiini Chant & McMurtry, 2005b: 191.
Subtribe Euseiina Chant & McMurtry, 2005b: 209.
Genus *Euseius* Wainstein, 1962

***Amblyseius* (*Amblyseius*) section *Euseius* Wainstein 1962: 15; *Euseius* De Leon 1966: 86.**

***Euseius gallicus* Kreiter & Tixier, 2010**

Euseius gallicus Kreiter & Tixier in Tixier *et al.* 2010: 242.

Specimen examined – one ♀ and one ♂ study. **Razavi Khorasan Province** – one ♀, Mashhad (1027 m aasl, 59° 32' 40.01" E, 36° 19' 33.82" N), on *Juglans regia* L. (Juglandaceae), 14.X.2020; one ♂, Rasht (3 m aasl, 49° 35' 33"E, 37° 16' 50.87" N), on *Parrotia persica* (De Candolle) Meyer (Hamamelidaceae), 28.VII.2020.

World distribution – Belgium, France, Germany, Italy, Mauritius, The Netherlands, Slovenia, Tunisia, Türkiye.

Remarks – This species is a new record for Iran. Morphological and morphometric characters fit well previous measurements published in the original description (Okassa *et al.* 2009; Tixier *et al.* 2010) and in a further paper (Döker *et al.* 2014). The female and the male collected were compared to females and males collected in various countries and present in the collection of CBGP.

Authors of *E. gallicus* have reported in the original descriptions of that species the comparison with *Euseius longiverticilis* (Liang & Ke), *Euseius kirghisicus* (Kolodochka) and then by Döker *et al.* 2014 with *Euseius ucrainicus* (Kolodochka), especially in idiosomal setae length. But *E. gallicus* differs from this latter in the peritreme length and spermatheca shape. Furthermore, when *E. gallicus* was described, the descriptors have asked the opinion of Dr. Kolodochka in Ukraine for him checking the new status of this new species in relation to those he already described, *i.e.* *E. kirghisicus*, and *E. ucrainicus* (Tixier pers. comm. 2014 and cited in the original description).

One close species of *Euseius gallicus* has been reported from Iran (Rahmani *et al.* 2010; Panahi *et al.* 2014; Hajizadeh and Mortazavi 2015): *Euseius amissibilis* Meshkov. *Euseius amissibilis* was described from Tajikistan, on *Platanus orientalis* L. When describing *E. gallicus*, Tixier *et al.* (2010) provided main differences between these two species: the lengths of setae *ZI*, *JV5* and to a lesser extent *j1*, *j3*, *S5* and *stIV*. The lengths of *JV5* and *S5* are much longer in *E. gallicus* than in *E. amissibilis*, while *ZI* is shorter in *E. gallicus* (Table 7). The fixed digit of *E. amissibilis* has two teeth instead of five as in *E. gallicus* (and this character is stable in this species) even if on the drawings of the original description, *E. amissibilis* seems to have more than two teeth on the fixed digit and perhaps more than five. The specimens presently considered from Iran, males and females, were compared to *Euseius gallicus* type material and additional material from several various localities in Europe and morphological characters and measurements are **identical**, with only very slight variations. When we observed the data provided in the two re-descriptions of *E. amissibilis* from Iran (Rahmani *et al.* 2010; Hajizadeh and Mortazavi 2015) (Table 7), it seems that these specimens have measurements closer to *E. gallicus* than to *E. amissibilis*. Hajizadeh and Mortazavi (2015) noted also the presence of 5 teeth of the fixed digit. In both re-descriptions, nothing is provided concerning the similarity between *E. gallicus* and *E. amissibilis*. Rahmani *et al.* (2010) who provided the first report of *E. amissibilis* from Iran, provided a diagnosis based on one specimen with only dorsal morphology available.

Because intraspecific variation exists in seta lengths (Tixier 2012), some minor doubts could remain on the synonymy between these two species. So at this state, two hypotheses could be provided (i) all specimens from Iran identified belong to *E. amissibilis* and *E. gallicus* and *E. amissibilis* are synonyms or (ii) all specimens from Iran belong to *E. gallicus* and *E. amissibilis* is a different species. We here consider the second hypothesis, (i) because of the complete description (morphological and molecular features) (Okassa *et al.* 2009; Tixier *et al.* 2010) of *E. gallicus* and (ii) because without

type observation (type material loan is impossible with the original country of description) and molecular data, it is not possible to valid the first hypothesis and the non-reliability of the characters distinguishing these two species. Further experiments using molecular data would be useful to conclude about potential synonymies.

Table 7. Main differences between *Euseius gallicus* and *E. amissibilis*, and mean measurements of these characters for the specimens identified as *E. amissibilis* from Iran (when re-descriptions are available) and for specimens presently reported.

Character	Specimen female from Iran presently collected in this survey	<i>E. gallicus</i> Kreiter & Tixier (in Tixier <i>et al.</i> 2010) - original description	<i>E. amissibilis</i> Meshkov (in Meshkov 1991) - original description	<i>E. amissibilis</i> - Iran-redescription (Hajizadeh & Mortazavi 2015)	<i>E. amissibilis</i> - Iran-redescription (Rahmani <i>et al.</i> 2010)
<i>j1</i>	32	33	40	32	33
<i>j3</i>	33	34	38	33	33
<i>Z1</i>	17	17	35	16	15
<i>S5</i>	29	28	19	30	26
<i>stIV</i>	54	58	68	57	50
Number of teeth on the fixed digit	5	5	2	5	not provided
<i>JV5</i>	41	40	23	40	not provided

Subfamily Phytoseiinae Berlese

Phytoseiini Berlese 1913: 3; Phytoseiinae Vitzthum 1941: 767.

Genus *Phytoseius* Ribaga, 1904: 177.

Phytoseius corniger Wainstein, 1959

Phytoseius (*Dubininellus*) *corniger* Wainstein, 1959: 1362.

Phytoseius (*Phytoseius*) *corniger*, Ehara 1966: 26.

Phytoseius corniger, Moraes *et al.* 1986: 220, 2004: 235; Chant & McMurtry 2007: 129.

Specimens examined – three ♀♀ and one ♂, three specimens measured. **Guilan Province** – three ♀♀ and one ♂, Rasht (3 m aasl, 49° 35' 33" E, 37° 16' 50.87" N), Anzali (22 m aasl, 49° 28' 13.42" E, 37° 27' 59.15" N), on *Vitis vinifera* L. (Vitaceae), in soil of fruit gardens (apple, pear, cherry), *Rubus idaeus* L. (Rosaceae) and *Quercus* sp. (Fagaceae), 10.VII and 25.IX.2020.

World distribution – India, Iran, Kazakhstan, Kyrgyzstan, Lebanon, Moldova, Pakistan, Serbia, Tajikistan, Turkmenistan.

Remarks – *Rubus idaeus* L. and *Quercus* sp. are new plant hosts for this mite in Iran, which has already been recorded from Guilan Province. Morphological characters agree well with those provided in Chant and Athias-Henriot (1960). All measurements (Table 8) fit well with the previous measurements published by Chant and Athias Henriot (1960), Denmark (1966), Karg (1991) and Kolodochka (2006).

Phytoseius finitimus Ribaga, 1904

Phytoseius finitimus Ribaga, 1904: 178; Chant 1959: 108; Moraes *et al.* 1986: 214; 2004: 252; Duso & Fontana (2002): 127; Chant & McMurtry 2007: 129.

Phytoseius (*Dubininellus*) *finitimus*, Wainstein 1959: 1365.

Phytoseius (*Pennaseius*) *finitimus*, Pritchard & Baker 1962: 223.

Pennaseius finitimus, Schuster & Pritchard 1963: 279.

Phytoseius (Phytoseius) finitimus, Denmark 1966: 16.

Phytoseius dubinini (Beglyarov, 1958): 116 (synonymy according to Pritchard & Baker 1962).

Table 8. Comparisons of measurements of adult females of *Phytoseius corniger* collected in this study with some from the literature (localities followed by the number of specimens measured between brackets).

Characters	This study (3)	?1 (?)	Central Europe (?)	Pakistan (1)	Kyrgyzstan (?)	?2 (?)
Dsl	298 (295–300)	300	–	278	320	–
Dsw at <i>s4</i> level	140 (125–150)	–	–	135	170	–
Dsw at <i>R1</i> level	–	–	–	–	–	–
N° of <i>gd</i>	–	–	–	–	–	–
Peritreme ext.	<i>jl</i>	–	–	–	–	–
<i>jl</i>	35 (33–38)	–	–	28	30	–
<i>j3</i>	69 (63–73)	65	–	60	72	65
<i>j4</i>	5 (5–6)	–	–	5	4	–
<i>j5</i>	6 (5–7)	–	–	5	4	–
<i>j6</i>	7 (5–8)	–	–	5	4	–
<i>J5</i>	7 (5–8)	–	–	6	8	–
<i>r3</i>	53 (50–55)	–	–	44	50	–
<i>s4</i>	145 (143–150)	140	–	129	not provided*	140
<i>s6</i>	84 (80–88)	80	–	75	85	80
<i>z2</i>	18 (16–19)	–	–	17	16	–
<i>z3</i>	35 (33–38)	–	–	29	37	–
<i>z4</i>	27 (25–28)	–	–	16	26	–
<i>z5</i>	6 (5–7)	–	–	5	5	–
<i>Z4</i>	103 (100–105)	105	105–115	104	115	105
<i>Z5</i>	87 (83–93)	90	100–110	79	88	90
<i>st1–st1</i>	51 (43–58)	–	–	–	–	–
<i>st2–st2</i>	67 (63–70)	–	–	–	–	–
<i>st3–st3</i>	78 (75–83)	–	–	–	–	–
<i>st1–st3</i>	56 (55–58)	–	–	–	–	–
<i>st4–st4</i>	93	–	–	–	–	–
Gensl	115 (103–130)	–	–	–	–	–
<i>st5–st5</i>	62 (61–63)	–	–	–	–	–
Gensw post. corn.	58 (50–63)	–	–	–	–	–
Lisl	29 (28–30)	–	–	–	–	–
Lsiw	4 (3–4)	–	–	–	–	–
Vsl	106 (105–108)	–	–	–	108	–
vsw <i>ZV2</i>	33 (30–37)	–	–	–	–	–
Vsw anus	49 (48–50)	–	–	–	56	–
<i>JV5</i>	51 (50–53)	–	–	60	65	–
scl	10 (8–13)	–	–	–	–	–
scw	10 (8–13)	–	–	–	–	–
<i>Sti IV</i>	64 (63–65)	60	–	83	51	60
<i>St IV</i>	34 (33–35)	–	–	35	31	–
<i>Stt IV</i>	30	–	–	–	–	–
Fdl, n° teeth	19 (18–20), 4	–	–	–	–	–
Mdl, n° teeth	21 (20–23), 1	–	–	–	–	–

Sources of measurements – ?1: Chant & Athias-Henriot (1960); **Central Europe:** Karg (1991); **Kyrgyzstan:** Kolodochka (2006); **Pakistan:** Denmark (1966); ?2: Wainstein (1959); –: not provided; ?: country and/or number not given. *: some errors in the setae names have been noted in this publication (names of setae repeated twice and absence of measurements of $AL4 = s4$).

This species is mainly reported in Mediterranean countries, and is especially frequent in Israel, Greece, Italy and South of France. It has been observed mainly on shrubs. A big confusion between

P. finitimus and *Phytoseius plumifer* (Canestrini & Fanzago) has existed for a long time and a tentative solution has been proposed by Duso and Fontana (2002). We herein follow these authors and do not consider valid the synonymy between these species indicated in Moraes *et al.* (2004). *Phytoseius finitimus* has been reported on grapevines and fig tree orchards in several countries in Europe. It seems to feed on *P. ulmi* (Duso and Moretto 1994) and various eriophyid mites (Rasmy and El-Banhawy 1974b), and it consumes pollen (Zaher *et al.* 1969; Rasmy and El-Banhawy 1975). High relative humidities and very hairy-leaved plants or varieties seem to be very suitable for *P. finitimus* (Rasmy and El-Banhawy 1974a; Duso and Moretto 1994).

Specimens examined – one ♀ and two ♂♂. **Sistan and Baluchestan Province** – one ♀ and two ♂♂, Konarak city, Kahir (29 m aasl, 60° 07' 53" E, 25° 35' 24" N), on *Citrus limon* (L.) Burman (Rutaceae), 17.IV.2018.

World distribution – Algeria, Azores, Egypt, France, Greece, Iran, Israel, Italy, Montenegro, Morocco, Portugal, Slovenia, Spain, Syria, Tunisia, Türkiye, USA. Precise distribution in Iran is documented in Kazemi *et al.* (2022).

Remarks – This species is widely distributed in Iran, almost in all provinces. It is however a new record for Sistan and Boulouchestan Provinces. All character measurements fit quite well with previous measurements published by Tixier *et al.* (2017). Our specimens do not fit at all the redescription by Duso and Fontana (2002) of *P. plumifer* (Canestrini and Fanzago) very often confused with *P. finitimus*.

Subfamily Typhlodrominae Wainstein, 1962

Typhlodromini Wainstein 1962: 26; Typhlodrominae Chant & McMurtry 1994: 235.

Tribe Paraseiulini Wainstein, 1976: 697.

Genus *Paraseiulus* Muma, 1961: 290.

Paraseiulus soleiger (Ribaga, 1904)

Seiulus soleiger Ribaga, 1904: 176.

Typhlodromus (*Neoseiulus*) *soleiger*, Nesbitt 1951: 39.

Typhlodromus (*Typhlodromus*) *soleiger*, Chant 1959: 59.

Paraseiulus soleiger, Muma 1961: 300.

Melodromus soleiger, Wainstein 1962: 23.

Neoseiulus soleiger, Schuster & Pritchard 1963: 201.

Typhlodromus (*Paraseiulus*) *soleiger*, van der Merwe 1968: 60.

Paraseiulus (*Paraseiulus*) *soleiger*, Wainstein 1976: 698.

Typhlodromus soleiger, Chant *et al.* 1978: 1338.

Paraseiulus soleiger, Moraes *et al.* 2004: 299; Chant & McMurtry 2007: 141.

Specimens examined – one ♀. **Guilan Province** – one ♀, Langrud (–19 m aasl, 50° 9' 6.36" E, 37° 11' 44.36" N), on *Rubus idaeus* L. (Rosaceae), 4.VIII.2020.

World distribution – Alaska, Armenia, Austria, Azerbaijan, Belarus, Canada, Caucasus Region, China, Czechoslovakia, Czech Republic, Denmark, England, Finland, France, Georgia, Germany, Greece, Hungary, Iran, Italy, Japan, Kazakhstan, Latvia, Lithuania, Moldova, The Netherlands, Norway, Poland, Russia, Serbia, Slovakia, Slovenia, Sweden, Switzerland, Tunisia, Türkiye, Ukraine, USA. Precise distribution in Iran is documented in Kazemi *et al.* (2022).

Remarks – *Paraseiulus soleiger* is widely distributed in Iran, in almost all provinces. Morphometric characters fit very well with previous measurements published, for example by Rahmani *et al.* (2010) and Ferragut (2018).

Tribe Typhlodromini Wainstein, 1962: 26.
Genus Typhlodromus Scheuten, 1857: 111.
Subgenus Typhlodromus (*Anthoseius*) De Leon, 1959: 258.

***Typhlodromus (Anthoseius) bagdasarjani* Wainstein & Arutunjan, 1967**

Typhlodromus bagdasarjani Wainstein & Arutunjan, 1967: 1765; Moraes *et al.* 2004: 311.

Typhlodromus (Neoseiulus) bagdasarjani, Arutunjan 1970: 16.

Anthoseius bagdasarjani, Rivnay & Swirski 1980: 177.

Amblydromella bagdasarjani, Moraes *et al.* 1986: 154.

Amblydromella (Aphanoseia) bagdasarjani, Denmark & Welbourn 2002: 293.

Typhlodromus (Anthoseius) kettanehi, Dosse 1967: 32 (synonymy according to Abbasova 1972).

Specimen examined – one ♀ collected and measured. **Guilan Province** – one ♀, Rasht (3 m aasl, 49° 35' 33" E, 37° 16' 50.87" N), on *Prunus persica* L. (Rosaceae), 15VIII.2020.

World distribution – Armenia, Azerbaijan, Iran, Kyrgyzstan (Kolodochka 2006), Lebanon, Türkiye, Turkmenistan. Precise distribution in Iran is documented in Kazemi *et al.* (2022).

Remarks – This species was already recorded from Iran in many Provinces and is very widespread in this country. Morphometric characters (Table 9) fit quite well with previous measurements published by Wainstein and Aruntunjan (1967), Rahmani *et al.* (2010) and Asali Fayaz *et al.* (2011, 2017).

Table 9. Comparisons of measurements of one adult female of *Typhlodromus (Anthoseius) bagdasarjani* collected in this study with some from the literature (localities followed by the number of specimens measured between brackets).

Characters	This study (1)	Armenia (?)	Iran 1 (5)	Iran 2 (6)	Iran 3 (?)
Dsl	350	330	340 (336–346)	362 (355–368)	345–365
Dsw at s4 level	188	175	188 (182–194)	174 (173–175)	170–190
Dsw at RI level	185	–	–	–	–
N° of gd	5	–	–	5	–
Peritreme ext.	$j1 - j3$	–	–	$z3 - z4$	$z3$
<i>j1</i>	25	20	20 (18–21)	25 (24–25)	24–26
<i>j3</i>	33	30	25 (19–27)	32 (31–33)	31–35
<i>j4</i>	19	20	17 (16–18)	20 (19–20)	19–22
<i>j5</i>	19	20	18 (16–19)	19 (18–19)	18–21
<i>j6</i>	23	20	23 (20–25)	22 (21–23)	25–28
<i>J2</i>	27	20	25 (23–26)	28 (26–30)	27–30
<i>J5</i>	11	10	7 (5–8)	11 (10–11)	9–10
<i>r3</i>	30	–	31 (30–34)	31 (28–33)	31–33
<i>RI</i>	25	–	21 (20–23)	27 (24–30)	28–30
<i>s4</i>	34	30	31 (30–33)	32 (28–35)	35–38
<i>s6</i>	38	35	32 (30–34)	38 (35–40)	37–40
<i>S2</i>	40	40	37 (35–40)	40 (35–45)	41–44
<i>S4</i>	36	30	34 (30–36)	37 (33–40)	35–38
<i>S5</i>	30	25	27 (26–28)	30 (27–33)	29–32
<i>z2</i>	25	20	21 (19–22)	23 (20–25)	25–27
<i>z3</i>	28	30	24 (20–26)	28 (27–28)	28–30
<i>z4</i>	30	25	23 (22–25)	29 (28–30)	29–33
<i>z5</i>	19	20	17 (16–19)	19 (18–20)	20–23
<i>Z4</i>	50	50	55 (52–58)	54 (52–55)	53–55
<i>Z5</i>	63	70	65 (62–67)	69 (65–73)	68–73
<i>st1-st1</i>	53	–	–	–	–

Sources of measurements – **Armenia:** Wainstein & Aruntunjan (1967); **Iran 1:** Rahmani *et al.* (2010); **Iran 2:** Asali Fayaz *et al.* (2011); **Iran 3:** Asali Fayaz *et al.* (2017); –: not provided; ?: number not given.

Table 9. Continued.

Characters	This study (1)	Armenia (?)	Iran 1 (5)	Iran 2 (6)	Iran 3 (?)
<i>st2-st2</i>	55	–	–	–	–
<i>st3-st3</i>	64	–	–	–	–
<i>st1-st3</i>	70	–	–	–	–
<i>st4-st4</i>	68	–	–	–	–
Gensl	128	–	–	113 (110–115)	115–130
Gensw post. corn.	64	–	–	75 (72–78)	65–75
<i>st5-st5</i>	78	–	–	–	–
Lisl	35	–	–	–	30–33
Lsiw	5	–	–	–	–
Sisl	15	–	–	–	14–17
Vsl	115	–	106 (104–107)	110–120	115–120
vsw ZV2	75	–	83 (79–85)	80–90	80–90
Vsw anus	65	–	–	–	–
JV5	50	–	–	50 (48–53)	53–58
scl	20	–	16 (14–17)	14 (11–17)	16–20
scw	10	–	–	10 (9–10)	9–10
St IV	50	50	30 (27–31)	48 (45–49)	49–54
Fdl, n° teeth	28, not visible	–	–	27, 4	26–28, 2
Mdl, n° teeth	25, not visible	–	–	25, 0	23–25, 0

Sources of measurements – **Armenia:** Wainstein & Aruntunjan (1967); **Iran 1:** Rahmani *et al.* (2010); **Iran 2:** Asali Fayaz *et al.* (2011); **Iran 3:** Asali Fayaz *et al.* (2017); –: not provided; ?: number not given.

Typhlodromus (Anthoseius) bakeri (Garman, 1948)

Seiulus bakeri Garman, 1948: 15.

Typhlodromus (Neoseiulus) bakeri, Nesbitt 1951: 36–37.

Typhlodromus bakeri, Cunliffe & Baker 1953: 10.

Typhlodromus (Typhlodromus) bakeri, Chant 1959: 63.

Typhlodromella bakeri, Muma 1961: 299.

Amblydromella bakeri, Muma 1967: 267–280; Moraes *et al.* 1986: 155.

Mumaseius bakeri, Abbasova 1972: 10.

Anthoseius (Aphanoseius) bakeri, Wainstein 1972: 1477–1482.

Anthoseius bakeri, Beglyarov 1981: 24.

Amblydromella (Aphanoseia) bakeri, Denmark & Welbourn 2002: 308.

Typhlodromus (Anthoseius) bakeri, Moraes *et al.* 2004: 311; Chant & McMurtry 2007: 152.

Anthoseius (Aphanoseius) clavatus Wainstein, 1972: 1481 (synonymy according to Evans & Edland 1998).

Specimens examined – seven ♀♀ and one ♂. **Guilan Province** – seven ♀♀ and one ♂, Anzali (–22 m aasl, 49° 28' 13.42" E, 37° 27' 59.15" N), on *Rubus idaeus* L. (Rosaceae), 25.IX. 2020.

World distribution – Alaska, Armenia, Australia, Austria, Azerbaijan, Canada, Caucasus Region, Czechoslovakia, Czech Republic, Denmark, England, Finland, France, Germany, Georgia, Greece, Hawaii, Hungary, India, Iran, Italy, Latvia, Moldova, Montenegro, The Netherlands, New Zealand, Norway, Poland, Portugal, Russia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye, Ukraine, USA. Precise distribution in Iran is documented in Kazemi *et al.* (2022).

Remarks – This species was already recorded from Iran in several Provinces. Morphometric characters fit well with previous measurements provided for example by Chant *et al.* (1974), Karg (1982), Ferragut *et al.* (2010), Rahmani *et al.* (2010) and Faraji *et al.* (2008). We have compared these specimens here collected with specimens from Slovenia (Kreiter *et al.* 2020a) and there are only very slight variations.

Typhlodromus (Anthoseius) caudiglans (Schuster, 1959)

Typhlodromus (Typhlodromus) caudiglans Schuster, 1959: 88; Chant 1959: 64; Muma 1961: 229; Chant *et al.* 1974: 1288; Schicha 1979: 222.

Typhlodromus (Anthoseius) caudiglans, Moraes *et al.* 2004: 315; Chant & McMurtry 2007: 152.

Neoseiulus caudiglans, Schuster and Pritchard 1963: 201.

Typhlodromella caudiglans, Muma (1961): 299.

Mumaseius caudiglans, Abbasova 1972: 10

Anthoseius (Amblydromellus) caudiglans, Wainstein 1975: 916.

Anthoseius caudiglans, Beglyarov & Malov 1977: 4.

Amblydromella caudiglans, Moraes *et al.* 1986: 157.

Amblydromella (Amblydromella) caudiglans, Denmark & Welbourn 2002: 295.

Typhlodromus (Anthoseius) nodosus (De Leon, 1962b): 11 (synonymy according to Abbasova 1972).

Typhlodromus (Anthoseius) timidus Wainstein & Arutunjan, 1968: 1241 (synonymy according to Abbasova 1972).

Specimen examined – one ♀. **Guilan Province** – one ♀, Rasht (3m aasl, 49° 35' 33" E, 37° 16' 50.87" N), on *Juglans regia* L. (Juglandaceae), 10.VII.2020.

World distribution – Alaska, Australia, Austria, Azerbaijan, Canada, China, Czechoslovakia, England, Iran, Japan, Latvia, Lithuania, Moldova, New Zealand, Norway, Russia, Slovakia, Ukraine, USA.

Remarks – This species was already recorded from Iran in Guilan Province. Morphological and morphometric characters fit well with previous measurements published for example by Schicha (1978), Hajizadeh *et al.* (2002) and Çobanoğlu *et al.* (2020).

Typhlodromus (Anthoseius) haiastanius (Arutunjan, 1977)

Anthoseius (Amblydromellus) invectus haiastanius Arutunjan, 1977: 50.

Amblydromella (Lindquistoseia) haiastania, Denmark & Welbourn 2002: 301.

Typhlodromus (Anthoseius) haiastanius, Moraes *et al.* 2004: 327; Chant & McMurtry 2007: 155.

Specimens examined – seven ♀♀ and one ♂ and four ♀♀ measured. **Guilan Province** – two ♀♀, Anzali (–22 m aasl, 49° 28' 13.42" E, 37° 27' 59.15" N), one ♀, one ♂, Rasht (3 m aasl, 49° 35' 33" E, 37° 16' 50.87" N), on *Malus domestica* Borkhausen (Rosaceae) and *Acer* sp. (Sapindaceae), 10.VII and 25.IX.2020. **Razavi Khorasan Province** – 4 ♀♀, Mashhad (1027 m aasl, 59° 32' 40.01" E, 36° 19' 33.82" N), on *M. domestica*, *Pyrus communis* L. (Rosaceae) and *Juglans regia* L. (Juglandaceae), 14.X.2020.

World distribution – Armenia, Azerbaijan, Iran. Precise distribution in Iran is documented in Kazemi *et al.* (2022).

Remarks – This species was already recorded from Iran in Lorestan Province but this present report is a new record for Guilan and Razavi Khorasan provinces. Morphological and morphometric characters fit well with the previous measurements provided by Jafari *et al.* (2011) (Table 10).

Table 10. Comparisons of measurements of one adult female of *Typhlodromus (Anthoseius) haiastanius* collected in this study with some from the literature (localities followed by the number of specimens measured between brackets).

Characters	This study (4)	Iran (6)	Characters	This study (4)	Iran (6)
Dsl	345 (335–363)	368 (366–370)	Z4	52 (50–53)	46 (44–48)
Dsw at s4 level	167 (148–180)	–	Z5	64 (63–65)	58 (56–59)
Dsw at RI level	179 (173–188)	188 (186–190)	stI–stI	53 (52–53)	52 (51–53)

Sources of measurements – **Iran:** Jafari *et al.* (2011); – : not provided.

Table 10. Continued.

Characters	This study (4)	Iran (6)	Characters	This study (4)	Iran (6)
N° of <i>gd</i>	5	–	<i>st2-st2</i>	59 (58–60)	57 (55–58)
Peritreme ext.	<i>j1</i>	<i>z4-s4</i>	<i>st3-st3</i>	69 (68–70)	–
<i>j1</i>	20 (18–23)	26 (25–27)	<i>st1-st3</i>	68 (64–70)	–
<i>j3</i>	27 (23–30)	32 (31–33)	<i>st4-st4</i>	77 (75–78)	–
<i>j4</i>	16 (15–18)	17 (16–18)	Gensl	125 (123–128)	104 (103–105)
<i>j5</i>	19 (15–24)	21 (20–22)	Gensw post. corn.	81 (75–88)	63 (63–65)
<i>j6</i>	22 (18–24)	23 (22–23)	<i>st5-st5</i>	64 (63–65)	62 (61–62)
<i>J2</i>	23 (20–25)	28 (27–29)	Lisl	30	–
<i>J5</i>	10	5 (5–6)	Lsiw	8	–
<i>r3</i>	25 (25–26)	31 (30–32)	Sisl	16 (15–16)	–
<i>R1</i>	20 (20–21)	32 (31–33)	Vsl	124 (115–133)	116 (112–120)
<i>s4</i>	26 (25–28)	32 (31–33)	vsw ZV2	80	67 (64–72)
<i>s6</i>	31 (30–33)	39 (37–40)	Vsw anus	71 (63–80)	–
<i>S2</i>	39 (38–40)	40 (39–41)	JV5	50	60 (60–61)
<i>S4</i>	37 (35–38)	36 (35–37)	scl	18	20 (19–22)
<i>S5</i>	28 (25–30)	35 (32–36)	scw	9	12 (10–14)
<i>z2</i>	20 (18–23)	25 (23–28)	St IV	46 (45–47)	52 (51–52)
<i>z3</i>	21 (18–25)	29 (27–31)	Fdl, n° teeth	23 (20–25), 3	28 (27–29), 3
<i>z4</i>	22 (18–26)	29 (28–29)	Mdl, n° teeth	25 (23–27), 1	28 (28–29), 1
<i>z5</i>	17 (15–18)	20 (19–21)			

Sources of measurements – Iran: Jafari *et al.* (2011); – : not provided.

Typhlodromus (Anthoseius) tamaricis (Kolodochka, 1982)

Anthoseius (Amblydromellus) tamaricis Kolodochka, 1982: 11.

Amblydromella tamaricis, Moraes *et al.* 1986: 176.

Amblydromella (Amblydromella) tamaricis, Kolodochka 1998: 52.

Amblydromella (Aphanoseia) tamaricis, Denmark & Welbourn 2002: 309.

Typhlodromus (Anthoseius) tamaricis, Moraes *et al.* 2004: 253; Chant & McMurtry 2007: 155.

Specimens examined – one ♀ collected and measured. **Sistan and Baluchestan Province** – one ♀, Zabol city (479 m aasl, 61° 28' 37" E, 30° 59' 26" N), on *Desmostachya bipinnata* L. (Poaceae), 6.II.2019.

World distribution – Greece, Iran, Saudi Arabia, Türkiye, Turkmenistan. Precise distribution in Iran is documented in Kazemi *et al.* (2022).

Remarks – This species was already recorded from Iran but is new for Sistan and Baluchestan Province. Morphological and morphometric characters fit well with the previous measurements published by Kolodochka (1982) in the original description, and by Kasap and Çobanoğlu (2009), Asali Fayaz *et al.* (2012) and Stathakis *et al.* (2016) for redescriptions of that species. The presently observed specimen has very short *Z4* and *Z5* compared to measurements provided by other authors (Table 11).

Table 11. Comparisons of measurements of one adult female of *Typhlodromus (Anthoseius) tamaricis* collected in this study with some from the literature (localities followed by the number of specimens measured between brackets).

Characters	This study (1)	Greece (10)	Iran (2)	Türkiye (3)	Turkmenistan (?)
Dsl	385	317 (309–325)	347 (335–358)	355 (345–370)	350
Dsw at <i>s4</i> level	195	147 (139–154)	–	188 (180–205)	155

Sources of measurements – Greece: Stathakis *et al.* (2016); Iran: Asali Fayaz *et al.* (2012); Türkiye: Kasap and Çobanoğlu (2009); Turkmenistan: Kolodochka (1982); –: not provided; ?: number not given.

Table 11. Continued.

Characters	This study (1)	Greece (10)	Iran (2)	Türkiye (3)	Turkmenistan (?)
Dsw at RI level	195	167 (150–178)	169 (168–170)	–	–
N° of gd	5	5	5	–	–
Peritreme ext.	<i>j1-j3</i>	<i>j3-z2</i>	<i>j3</i>	–	–
<i>j1</i>	28	23 (33–24)	21 (20–22)	21 ± 1.02 (20–23)	23
<i>j3</i>	21	25 (24–26)	24 (23–25)	21 ± 1.66 (18–23)	15
<i>j4</i>	18	15 (14–16)	14 (12–16)	9 ± 1.02 (8–10)	14
<i>j5</i>	18	15 (14–16)	15 (14–15)	9 ± 1.02 (8–10)	15
<i>j6</i>	19	18 (16–20)	17 (16–17)	9 ± 1.02 (8–10)	17
<i>J2</i>	20	21 (20–24)	19 (18–20)	–	19
<i>J5</i>	15	6 (4–6)	7 (5–8)	–	7
<i>r3</i>	28	21 (20–22)	21 (20–22)	–	21
<i>RI</i>	19	21 (20–24)	22 (20–23)	–	17
<i>s4</i>	18	22 (20–24)	19 (18–19)	14 ± 1.66 (13–18)	21
<i>s6</i>	25	27 (24–30)	24 (22–25)	22 ± 1.66 (20–25)	24
<i>S2</i>	25	31 (28–34)	27 (25–29)	29 ± 2.20 (25–33)	28
<i>S4</i>	25	28 (26–30)	29 (28–29)	28 ± 1.44 (25–30)	28
<i>S5</i>	25	30 (28–34)	24 (22–25)	29 ± 2.20 (25–33)	15
<i>z2</i>	14	18 (16–20)	17 (16–17)	14 ± 1.66 (13–18)	20
<i>z3</i>	15	21 (20–24)	18 (17–19)	19 ± 4.40 (13–28)	20
<i>z4</i>	15	21 (20–22)	21 (19–22)	16 ± 3.06 (13–20)	20
<i>z5</i>	15	15 (14–16)	14 (13–15)	–	17
<i>Z4</i>	28	37 (34–40)	33 (30–35)	35 ± 2.5 (33–40)	36
<i>Z5</i>	30	48 (46–50)	46 (42–49)	50 ± 1.44 (48–53)	50
<i>st1-st1</i>	40	–	–	–	–
<i>st2-st2</i>	55	55 (51–57)	–	–	–
<i>st3-st3</i>	63	–	–	–	–
<i>st1-st3</i>	78	–	–	–	–
<i>st4-st4</i>	70	–	–	–	–

Sources of measurements – Greece: Stathakis *et al.* (2016); Iran: Asali Fayaz *et al.* (2012); Türkiye: Kasap and Çobanoğlu (2009); Turkmenistan: Kolodochka (1982); – : not provided; ?: number not given.

CONCLUSION

The results in four provinces of Iran (Guilan, Razavi Khorasan, Mazandaran, and Sistan and Baluchestan Provinces) showed that *Euseius gallicus* and *Proprioseiopsis lineatus* are new records for Iran.

Other species which were already recorded from Iran either were found on new plant hosts, some being recorded for the first time for Guilan (3 species), Razavi Khorasan (one species), Mazandaran (two species), and Sistan and Baluchestan Provinces (9 species).

ACKNOWLEDGEMENTS

We would like to thank Iranian Research Institute of Plant Protection for technical support of this research. Also, special thanks to reviewers and editor of the journal Persian Journal of Acarology for valuable comments and great improvement of an early version of the manuscript.

REFERENCES

- Abbasova, E.D. (1972) *Phytoseiid mites (Parasitiformes: Phytoseiidae) of Azerbaijan*. Avtoreferat Dissertatsii na Soiskanie Uchenoy Stepeni Kandidata Biologicheskikh Nauk. Akademiya Nauk Azerbaydzhanskoy SSR, Institut Zoologii, Baku, Azerbaijan, 34 pp.

- Abo-Shnaf, R.I.A. & Moraes, G.J. de. (2014) Phytoseiid mites (Acari: Phytoseiidae) from Egypt, with new records, descriptions of new species, and a key species. *Zootaxa*, 3865: 1–71. DOI: [10.11646/zootaxa.3865.1.1](https://doi.org/10.11646/zootaxa.3865.1.1)
- Amitai, S. & Grinberg, T. (1971) Description of a new phytoseiid genus and species (Acarina: Mesostigmata) from Israel. *Israel Journal of Entomology*, 6: 327–335.
- Arutunjan, E.S. (1970) *Phytoseiid mites (Phytoseiidae) on agricultural crops in the Armenian SSR*. Akademii Nauk Armyanskoi SSR, Otdelenie Biologicheskikh Nauk, Dissertatsii na Soiskanie Uchenoi Stepeni Candidata Biologicheskikh Nauk, Zooliya, 97: 31 pp.
- Arutunjan, E.S. (1977) *Identification manual of phytoseiid mites of agricultural crops of the Armenian SSR*. Akademiya Nauk Armyanskoi SSR, Zoologicheskii Institut, Erevan, Armenia, 177 pp.
- Asali Fayaz, B. & Khanjani M. (2012) Phytoseiid mites (Acari: Mesostigmata) in some regions of western and north western Iran. *Journal of Crop Protection*, 1(2): 161–172.
- Asali Fayaz, B., Khanjani, M., Hajizadeh, J. & Ueckermann, E.A. (2012) A re-description of *Typhlodromus (Anthoseius) tamaricis* (Kolodochka) (Mesostigmata: Phytoseiidae), a first record for Iran. *Acarologia*, 52(4): 425–431.
- Asali Fayaz, B., Khanjani, M., Molavi, F. & Ueckermann, E.A. (2011) Phytoseiid mites (Acari: Phytoseiidae) of apple and almond trees in regions of western and south-western Iran. *Acarologia*, 51(3): 371–379. DOI: [10.1051/acarologia/20112020](https://doi.org/10.1051/acarologia/20112020)
- Asali Fayaz, B., Khanjani, M., Rahmani, H. & Ueckermann, E.A. (2017) Complementary description of *Typhlodromus (Anthoseius) bagdasarjani* Wainstein and Arutunjan (Acari: Mesostigmata: Phytoseiidae) based on specimens from western Iran. *Acarologia*, 57(2): 255–267. DOI: [10.1051/acarologia/20164153](https://doi.org/10.1051/acarologia/20164153)
- Athias-Henriot, C. (1959) Acariens planticoles d'Algérie. I. 5e contribution au genre *Amblyseius* Berlese (Phytoseiidae). II. Première liste d'Actinochitinosi (Cheyletidae, Caligonellidae, Hemisarcopitidae). *Bulletin de l'Académie Royale de Belgique, Sciences (Ser. 5)*, 45: 130–153.
- Athias-Henriot, C. (1961) Mésostigmatés (*Uropodes exclus*) édaphiques Méditerranéens (Acaromorpha, Anactinotrichida). *Acarologia*, 3 : 381–509.
- Athias-Henriot, C. (1962) *Amblyseius swirskii*, un nouveau phytoseiide voisin d'*A. andersoni* (Acariens anactinotriches). *Annales de l'Ecole Nationale d'Agriculture d'Alger*, 3 : 1–7.
- Athias-Henriot, C. (1975) Nouvelles notes sur les Amblyseiiini. II. Le relevé organotaxique de la face dorsale adulte (Gamasides protoadéniques, Phytoseiidae). *Acarologia*, 17(1) : 20–29.
- Athias-Henriot, C. (1977) Nouvelles notes sur les Amblyseiiini. III. Sur le genre *Cydnodromus*: Redéfinition, composition (Parasitiformes, Phytoseiidae). *Entomophaga*, 22: 61–73. DOI: [10.1007/BF02372991](https://doi.org/10.1007/BF02372991)
- Auger, P., Tixier, M.-S., Kreiter, S. & Fauvel, G. (1999) Factors affecting ambulatory dispersal in the predaceous mite *Neoseiulus californicus*. *Experimental and Applied Acarology*, 23: 235–250. DOI: [10.1023/A:1006019014708](https://doi.org/10.1023/A:1006019014708)
- Basha, A.A., Yousef, A.T.A., Ibrahim, M.H. & Mostafa, E.S. (2001) Five new phytoseiids from Egypt (Acari: Gamasida: Phytoseiidae). *Al-Azhar Journal of Agricultural Research*, 33: 371–386.
- Beaulieu, F. & Beard, J.J. (2018) Acarine biocontrol agents *Neoseiulus californicus* sensu Athias-Henriot (1977) and *N. barkeri* Hughes (Mesostigmata: Phytoseiidae) redescribed, their synonymies assessed, and the identity of *N. californicus* (McGregor) clarified based on examination of types. *Zootaxa*, 4500(4): 451–507. DOI: [10.11646/zootaxa.4500.4.1](https://doi.org/10.11646/zootaxa.4500.4.1)

- Beglyarov, G.A. (1958) Species of Phytoseiidae (Parasitiformes: Gamasoidea) predatory upon tetranychid mites in orchards of the Krasnodar region. *Trudy Vsesoiuznogo Institut Zashchity Rastenii*, 10: 98–124.
- Beglyarov, G.A. (1962) On the fauna of predaceous mites of the family Phytoseiidae in Krasnodar region. In: Zimina, L.S. & Shchepetil'nikovoii, V.A. (Eds.), *Biologicheskii Metod Bor'by s Vreditelyami i Boleznyami Cel'skokhozyaystvennykh kul'tur*, 1: 198–203.
- Beglyarov, G.A. (1981) *Keys to the determination of phytoseiid mites of the USSR*. Information Bulletin of the International Organization for Biological Control of Noxious Animals and Plants, East Palaearctic Section, Leningrad, Russia, 2: 97 pp.
- Beglyarov, G.A. & Malov, N.A. (1977) Predaceous phytoseiid mites (Phytoseiidae: Parasitiformes) of the fauna of Moldavia and north Bukovina (Report II). *Entomofagi v Zashchite Rasteniy. Vsesoyuznaya Ordena Lenina Akademiya Sel'skokhozyaystvennykh Nauk Imeni V. I. Lenina. Kishinev*, pp. 3–11.
- Berlese, A. (1889) Acari, Myriopoda et Scorpiones hucusque in Italia reperta. *Tipografia Del Seminario*, 6(54): 79.
- Berlese, A. (1913) Systema Acarorum genera in familiis suis disposita. *Acaroteca Italica*, 1–2: 3–19.
- Berlese, A. (1914) Acari nuovi. Manipulus IX. *Redia*, 10: 113–150.
- Berlese, A. (1916) Centuria prima di Acari nuovi. *Redia*, 12: 19–66.
- Berlese, A. (1918) Centuria quarta di Acari nuovi. *Redia*, 12(2): 115–192.
- Blommers, L. & Chazeau J. (1974) Two new species of predator mites of the genus *Amblyseius* Berlese (Acarina: Phytoseiidae) from Madagascar. *Zeitschrift für Angewandte Entomologie*, 75: 308–315. DOI: [10.1111/j.1439-0418.1974.tb01856.x](https://doi.org/10.1111/j.1439-0418.1974.tb01856.x)
- Buitenhuis, R., Murphy, G., Shipp, L. & Scott-Dupree, C. (2015) *Amblyseius swirskii* in greenhouse production systems: a floriculture perspective. *Experimental and Applied Acarology*, 65: 451–464. DOI: [10.1007/s10493-014-9869-9](https://doi.org/10.1007/s10493-014-9869-9)
- Byng, J.W., Smets, E.F., van Vugt, R., Bidault, E., Davidson, C., Kenicer, G., Chase, M.W. & Christenhusz, M.J.M. (2018) The phylogeny of angiosperms poster: a visual summary of APG IV family relationships and floral diversity. *The Global Flora*, p. 47.
- Calvo, F.J., Knapp, M., van Houten, Y.M., Hoogerbrugge, H. & Belda, J. E. (2015) *Amblyseius swirskii*: What made this predatory mite such a successful biocontrol agent? *Experimental and Applied Acarology*, 65: 419–433. DOI: [10.1007/s10493-014-9873-0](https://doi.org/10.1007/s10493-014-9873-0)
- Castagnoli, M. & Simoni, S. (2003) *Neoseiulus californicus* (McGregor) (Acari Phytoseiidae): Survey of biological and behavioural traits of a versatile predator. *Redia*, 86: 153–164.
- Chant, D.A. (1957) Descriptions of some phytoseiid mites (Acarina, Phytoseiidae). Part I. Nine new species from British Columbia with keys to the species of British Columbia. Part II. Redescriptions of eight species described by Berlese. *The Canadian Entomologist*, 89(7): 289–308. DOI: [10.4039/Ent89289-7](https://doi.org/10.4039/Ent89289-7)
- Chant, D.A. (1959) Phytoseiid mites (Acarina: Phytoseiidae). Part I. Bionomics of seven species in southeastern England. Part II. A taxonomic review of the family Phytoseiidae, with descriptions of thirty-eight new species. *The Canadian Entomologist*, 61(12): 1–166. DOI: [10.4039/entm9112fv](https://doi.org/10.4039/entm9112fv)
- Chant, D.A. & Athias-Henriot, C. (1960) The genus *Phytoseius* Ribaga, 1902 (Acarina: Phytoseiidae). *Entomophaga*, 5: 213–228. DOI: [10.1007/BF02383272](https://doi.org/10.1007/BF02383272)
- Chant, D.A. & Hansell, R.I.C. (1971) The genus *Amblyseius* (Acarina: Phytoseiidae) in Canada and Alaska. *Canadian Journal of Zoology*, 49(5): 703–758. DOI: [10.1139/z71-110](https://doi.org/10.1139/z71-110)

- Chant, D.A., Hansell, R.I.C. & Rowell, H. (1978) A numerical taxonomic study of variation in populations of *Typhlodromus cuudiglans* Schuster (Acarina: Phytoseiidae). *Canadian Journal of Zoology*, 56: 55–65. DOI: [10.1139/z78-007](https://doi.org/10.1139/z78-007)
- Chant, D.A., Hansell, R.I.C. & Yoshida-Shaul, E. (1974) The genus *Typhlodromus* Scheuten (Acarina: Phytoseiidae) in Canada and Alaska. *Canadian Journal of Zoology*, 52: 1265–1291. DOI: [10.1139/z74-168](https://doi.org/10.1139/z74-168)
- Chant, D.A. & McMurtry, J.A. (1994) A review of the subfamilies Phytoseiinae and Typhlodrominae (Acari: Phytoseiidae). *International Journal of Acarology*, 20(4): 223–310. DOI: [10.1080/01647959408684022](https://doi.org/10.1080/01647959408684022)
- Chant, D.A. & McMurtry, J.A. (2003) A review of the subfamily Amblyseiinae Muma (Acari: Phytoseiidae): Part I. Neoseiulini new tribe. *International Journal of Acarology*, 29(1): 3–46. DOI: [10.1080/01647950308684319](https://doi.org/10.1080/01647950308684319)
- Chant, D.A. & McMurtry, J.A. (2004) A review of the subfamily Amblyseiinae Muma (Acari: Phytoseiidae): Part III. The tribe Amblyseiini Wainstein, subtribe Amblyseiina n. subtribe. *International Journal of Acarology*, 30(3): 171–228. DOI: [10.1080/01647950408684388](https://doi.org/10.1080/01647950408684388)
- Chant, D.A. & McMurtry, J.A. (2005a) A review of the subfamily Amblyseiina Muma (Acari: Phytoseiidae): Part V. Tribe Amblyseiini, subtribe Proprioseiopsina Chant & McMurtry. *International Journal of Acarology*, 31(1): 3–22. DOI: [10.1080/01647950508684412](https://doi.org/10.1080/01647950508684412)
- Chant, D.A. & McMurtry, J.A. (2005b) A review of the subfamily Amblyseiinae Muma (Acari: Phytoseiidae) Part VI. The tribe Euseiini n. tribe, subtribes Typhlodromalina n. subtribe, Euseiina n. subtribe, and Ricoseiina n. subtribe. *International Journal of Acarology*, 31(3): 187–224. DOI: [10.1080/01647950508684424](https://doi.org/10.1080/01647950508684424)
- Chant, D.A. & McMurtry, J.A. (2007) *Illustrated keys and diagnoses for the genera and subgenera of the Phytoseiidae of the world (Acari: Mesostigmata)*. Indira Publishing House, West Bloomfield, 219 pp.
- Chant, D.A. & Yoshida-Shaul, E. (1989) A world review of the *tiliarum* species group in the genus *Typhlodromus* Scheuten (Acari: Phytoseiidae). *Canadian Journal of Zoology*, 67(4): 1006–1046.
- Chant, D.A. & Yoshida-Shaul, E. (1991) Adult ventral setal patterns in the family Phytoseiidae (Acari: Gamasina). *International Journal of Acarology*, 17(3): 187–199. DOI: [10.1080/01647959108683906](https://doi.org/10.1080/01647959108683906)
- Chaudhri, W.M., Akbar, S. & Rasool, A. (1979) *Studies on the predatory leaf inhabiting mites of Pakistan*. University of Agriculture, Faisalabad, Pakistan, 243 pp.
- Çobanoğlu, S., Akçakoyunlúoğlu, K. & Çalmaşur, Ö. (2020) *Typhlodromus (Anthoseius) caudiglans* (Schuster, 1959) (Acari: Phytoseiidae) as predatory mite in Erzurum-Turkey. *Tarım Bilimleri Dergisi*, 26: 130–137. DOI: [10.15832/ankutbd.498043](https://doi.org/10.15832/ankutbd.498043)
- Congdon, B.D. (2002) The family Phytoseiidae (Acari) in western Washington State with descriptions of three new species. *International Journal of Acarology*, 28(1): 3–27. DOI: [10.1080/01647950208684275](https://doi.org/10.1080/01647950208684275)
- Corpuz, L.A. & Rimando, L. (1966) Some Philippine Amblyseiinae (Phytoseiidae: Acarina). *Philippines Agriculture*, 50: 114–136.
- Cunliffe, F. & Baker, E.W. (1953) *A guide to the predatory phytoseiid mites of the United States*. Pinellas Biology Laboratory, Inc., USA, 1, 28 pp.
- Daneshvar, H. (1987) Some predacious mites from Iran, with descriptions of one new genus and six new species (Acari: Phytoseiidae, Ascidae). *Entomologie et Phytopathologie Appliquées*, 54 (1–2): 13–37 (In English), 55–73 (In Persian).

- Daneshvar, H. & Denmark, H.A. (1982) Phytoseiids of Iran (Acarina: Phytoseiidae). *International Journal of Acarology*, 8: 3–14. DOI: [10.1080/01647958208683272](https://doi.org/10.1080/01647958208683272)
- De Leon, D. (1957) Three new *Typhlodromus* from southern Florida (Acarina: Phytoseiidae). *The Florida Entomologist*, 40: 141–144. DOI: [10.2307/3492041](https://doi.org/10.2307/3492041)
- De Leon, D. (1959) Two new genera of phytoseiid mites with a note on *Proprioseius meridionalis* Chant (Acarina: Phytoseiidae). *Entomological News*, 70(10): 257–262.
- De Leon, D. (1962) Twenty-three new phytoseiids, mostly from southeastern United States (Acarina: Phytoseiidae). *The Florida Entomologist*, 45(1): 11–27. DOI: [10.2307/3492899](https://doi.org/10.2307/3492899)
- De Leon, D. (1966) Phytoseiidae of British Guyana with keys to species (Acarina: Mesostigmata). *Studies on the Fauna of Suriname and Other Guyanas*, 8: 81–102.
- Demite, P.R., McMurtry, J.A. & Moraes, G.J. de (2014) Phytoseiidae Database: a website for taxonomic and distributional information on phytoseiid mites (Acari). *Zootaxa*, 3795(5): 571–577. DOI: [10.11646/zootaxa.3795.5.6](https://doi.org/10.11646/zootaxa.3795.5.6)
- Demite, P.R., Moraes, G.J. de, McMurtry, J.A., Denmark, H.A. & Castilho, R.C. (2022) Phytoseiidae database. University of São Paulo, Brazil. Available from: www.lea.esalq.usp.br/phytoseiidae (Accessed on September 2022).
- Denmark, H.A. (1965) Four new Phytoseiidae (Acari: Mesostigmata) from Florida. *The Florida Entomologist*, 48: 89–95. DOI: [10.2307/3493097](https://doi.org/10.2307/3493097)
- Denmark, H.A. (1966) Revision of the genus *Phytoseius* Ribaga, 1904 (Acarina: Phytoseiidae). *Florida Department of Agriculture Bulletin*, 6: 1–105.
- Denmark, H.A. & Evans, G.A. (2011) *Phytoseiidae of North America and Hawaii* (Acari: Mesostigmata). Indira Publishing House, West Bloomfield, USA, 451 pp.
- Denmark, H.A. & Muma, M.H. (1989) A revision of the genus *Amblyseius* Berlese (1914) (Acari: Phytoseiidae). *Occasional papers of the Florida State Collection of Arthropods (USA)*, 4: 1–149.
- Denmark, H.A. & Welbourn, W.C. (2002) Revision of the genera *Amblydromella*, Muma and *Anthoseius*, De Leon (Acari: Phytoseiidae). *International Journal of Acarology*, 28(4): 291–316. DOI: [10.1080/01647950208684308](https://doi.org/10.1080/01647950208684308)
- Döker, I., Kazak, C. & Karut, K. (2020) The genus *Amblyseius* Berlese (Acari: Phytoseiidae) in Turkey with discussion on the identity of *Amblyseius meridionalis*. *Systematic and Applied Acarology*, 25(8): 1395–1420. DOI: [10.11158/saa.25.8.4](https://doi.org/10.11158/saa.25.8.4)
- Döker, I., Witters, J., Pijnakker, J., Kazak, C., Tixier, M.-S. & Kreiter, S. (2014) *Euseius gallicus* Kreiter and Tixier (Acari: Phytoseiidae) is present in four more countries in Europe: Belgium, Germany, The Netherlands and Turkey. *Acarologia*, 54(3): 245–248. DOI: [10.1051/acarologia/20142132](https://doi.org/10.1051/acarologia/20142132)
- Dosse, G. (1957) Morphologie und biologie von *Typhlodromus zwoelferi* n. sp. (Acar., Phytoseiidae). *Zeitschrift für Angewandte Entomologie*, 41(2–3): 301–311. DOI: [10.1111/j.1439-0418.1957.tb01295.x](https://doi.org/10.1111/j.1439-0418.1957.tb01295.x)
- Dosse, G. (1958) Über einige neue Raubmilbenarten (Acari: Phytoseiidae). *Pflanzenschutz Berichte*, 21 : 44–61
- Dosse, G. (1967) Schadmilben des Libanons und ihre Pradatoren. *Zeitschrift für Angewandte Entomologie*, 59: 16–48. DOI: [10.1111/j.1439-0418.1967.tb03837.x](https://doi.org/10.1111/j.1439-0418.1967.tb03837.x)
- Duso, C. & Fontana, P. (2002) On the identity of *Phytoseius plumifer* (Canestrini & Fanzago, 1876) (Acari: Phytoseiidae). *Acarologia*, 42(2): 127–136.
- Duso, C. & Moretto, S. (1994) Osservazioni preliminari sui comportamento dell'acaro predatore *Phytoseius plumifer* (Can. et Fanz.). *Memorie della Società Entomologica Italiana*, 72: 533–540.

- Easterbrook, M.A., Fitzgerald, J.D. & Solomon, M.G. (2001) Biological control of strawberry tarsonemid mite *Phytonemus pallidus* and two-spotted spider mite *Tetranychus urticae* on strawberry in the UK using species of *Neoseiulus* (*Amblyseius*) (Acari: Phytoseiidae). *Experimental Applied Acarology*, 25: 25–36. DOI: [10.1023/A:1010685903130](https://doi.org/10.1023/A:1010685903130)
- Ehara, S. (1966) A tentative catalogue of predatory mites of Phytoseiidae known from Asia, with descriptions of five new species from Japan. *Mushi*, 39: 9–30.
- Ehara, S. (1985) Five species of phytoseiid mites from Japan with descriptions of two new species (Acarina, Phytoseiidae). *Zoological Science*, 2(1): 115–121.
- Ehara, S. & Amano, H. (1998) A revision of the mite family Phytoseiidae in Japan (Acari: Gamasina), with remarks on its biology. *Species Diversity*, 3(1): 25–73. DOI: [10.12782/specdiv.3.25](https://doi.org/10.12782/specdiv.3.25)
- Ehara, S. & Amano, H. (2004) Checklist and keys to Japanese, Amblyseiinae (Acari: Gamasina: Phytoseiidae). *Journal Acarology Society Japan*, 13(1): 1–30. DOI: [10.2300/acari.13.1](https://doi.org/10.2300/acari.13.1)
- Ehara, S. & Bhandhufalck, A. (1977) Phytoseiid mites of Thailand (Acarina: Mesostigmata). *Journal of the Faculty of Education of Tottori University, Natural Sciences*, 27(2): 43–82.
- Ehara, S., Okada, Y. & Kato, H. (1994) Contribution to the knowledge of the mite family Phytoseiidae in Japan (Acari: Gamasina). *Journal of the Faculty of Education of Tottori University, Natural Sciences*, 42(2): 119–160.
- El-Badry, E.A. (1967) Five new phytoseiid mites from U. A. R., with collection notes on three other species (Acarina: Phytoseiidae). *Indian Journal of Entomology*, 29: 177–184.
- Evans, G.O. (1965) The ontogenetic development of the chaetotaxy of the tarsi of legs II-IV in the Antennophorina (Acari: Mesostigmata). *Annual Magasin of Natural History, Series 13*, 8: 81–83. DOI: [10.1080/00222936508651543](https://doi.org/10.1080/00222936508651543)
- Evans, G.O. & Edland, T. (1998) The genus *Anthoseius* De Leon (Acari: Mesostigmata) in Norway. *Fauna Norvegica, Ser. B*, 45: 41–62.
- Famah Sourassou, N., Hanna, R., Zannou, I., Moraes, G.J. de, Negloh, K. & Sabelis, M.W. (2011) Morphological variation and reproductive incompatibility of three coconut-mite-associated populations of predatory mites identified as *Neoseiulus paspalivorus* (Acari: Phytoseiidae). *Experimental and Applied Acarology*, 53: 323–338. DOI: [10.1007/s10493-010-9413-5](https://doi.org/10.1007/s10493-010-9413-5)
- Faraji, F., Çobanoğlu, S. & Çakmak, I. (2011) A checklist and a key for the Phytoseiidae species of Turkey with two new species records (Acari: Mesostigmata). *International Journal of Acarology*, 37(Supl. 1): 221–243. DOI: [10.1080/01647954.2011.558851](https://doi.org/10.1080/01647954.2011.558851)
- Faraji, F., Hajizadeh, J., Ueckermann, E.A., Kamali, K. & McMurtry, J.A. (2007) Two new records for Iranian phytoseiid mites with synonymy and keys to the species of *Typhloseiulus* Chant and McMurtry and Phytoseiidae in Iran (Acari: Mesostigmata). *International Journal of Acarology*, 33(3): 231–239. DOI: [10.1080/01647950708684527](https://doi.org/10.1080/01647950708684527)
- Faraji, F., Sakenin-Chelav, H., Kamali, K. & McMurtry, J.A. (2008) Four new species records of Phytoseiidae (Acari: Mesostigmata) for Iran, and description of variability in the spermatheca of *Typhlodromus bakeri*. *Systematic and Applied Acarology*, 13: 123–132.
- Ferragut, F. (2018) New records of phytoseiid mites of the subfamilies Typhlodrominae and Phytoseiinae (Acari: Phytoseiidae) from Spain, with description of a new species and re-description of four species of *Typhlodromus* Scheuten. *Systematic and Applied Acarology*, 23(5): 883–910. DOI: [10.11158/saa.23.5.8](https://doi.org/10.11158/saa.23.5.8)
- Ferragut, F., Pérez Moreno, I., Iraola, V. & Escudero, A. (2010) *Ácaros depredadores em las plantas cultivadas. Família Phytoseiidae*. Ediciones Agrotécnicas, Madrid, 202 pp.
- Garman, P. (1948) Mite species from apple trees in Connecticut. *Connecticut Agricultural Experiment Station, Bulletin, New Haven, USA*, 520: 1–27.

- Garman, P. (1958) New species belonging to the genera *Amblyseius* and *Amblyseiopsis*, with keys to *Amblyseius*, *Amblyseiopsis*, and *Phytoseiulus*. *Annual Entomological Society of America*, 51: 69–79. DOI: [10.1093/aesa/51.1.69](https://doi.org/10.1093/aesa/51.1.69)
- Gerson, U., Smiley, R.L. & Ochoa, R. (2003) *Mites (Acari) for Pest Control*. Blackwell Science Ltd., UK, 539 pp. DOI: [10.1002/9780470750995](https://doi.org/10.1002/9780470750995)
- Ghai, S. & Gupta, S.K. (1984) A new species of *Treatia* Krantz and Khot (Acari: Otophe Idomenidae [Otopheidomenidae]) with a new record of *Amblyseius* Berlese (Acari: Phytoseiidae) from India. *Bulletin of the Zoological Survey of India*, 6(1–3): 171–175.
- Gomelaury, L.A. (1968) Three new species of mites of the family Phytoseiidae, in southern Georgia. *Bulletin of the Academy of Sciences of the Georgian SSR, Zoology and Parasitology*, 52(2): 515–520.
- Gomez-Moya, C.A. & Ferragut, F. (2009) Spatial distribution pattern and efficacy of *Neoseiulus californicus* and *Phytoseiulus persimilis* (Acari: Phytoseiidae) in the control of red spider mites on vegetables under semi-field conditions. *Bolletín Sanidad Vegetal Plagas*, 35: 377–390.
- Guanilo, A.D., Moraes, G.J. de & Knapp, M. (2008a) Phytoseiid mites (Acari: Phytoseiidae) of the subfamily Amblyseiinae Muma from Peru, with description of four new species. *Zootaxa*, 1880: 1–47. DOI: [10.11646/zootaxa.1880.1.1](https://doi.org/10.11646/zootaxa.1880.1.1)
- Guanilo, A.D., Moraes, G.J. de, Toledo, S. & Knapp, M. (2008b) Phytoseiid mites (Acari: Phytoseiidae) from Argentina, with description of a new species. *Zootaxa*, 1884: 1–35. DOI: [10.11646/zootaxa.1884.1.1](https://doi.org/10.11646/zootaxa.1884.1.1)
- Gupta, S.K. (1986) *Fauna of India. Family Phytoseiidae*. Zoological Survey of India, Calcutta, India, 350 pp.
- Hajizadeh, J. & Faraji, F. (2016) *Identification guide and diagnosis, key for predatory mites, of the family Phytoseiidae of Iran*. University of Guilan Press, Rasht, Iran, 164 pp. (In Persian).
- Hajizadeh, J., Hosseini, R. & McMurtry, J.A. (2002) Phytoseiid mites (Acari: Phytoseiidae) associated, with eriophyid mites (Acari: Eriophyidae) in Guilan province of Iran. *International Journal of Acarology*, 28(4): 373–378. DOI: [10.1080/01647950208684313](https://doi.org/10.1080/01647950208684313)
- Hajizadeh, J. & Mortazavi, S. (2015) The genus *Euseius* Wainstein (Acari: Phytoseiidae) in Iran, with a revised key to Iranian phytoseiid mites. *International Journal of Acarology*, 41(1): 53–66.
- Hajizadeh, J. & Nazari, M. (2012) A checklist and key for the phytoseiid mites (Acari: Phytoseiidae) of citrus orchards in Iran, with a new record for Iranian phytoseiid mites. *Systematic and Applied Acarology*, 17: 388–396. DOI: [10.11158/saa.17.4.7](https://doi.org/10.11158/saa.17.4.7)
- Hirschmann, W. (1962) *Gangsystematik der Parasitiformes. Acarologie, Schriftenreihe für Vergleichende Milbenkunde*. Hirschmann-Verlag, Furth/Bay, 5(5–6): 80 pp. + 32 plates.
- Hughes, A.M. (1948) *The mites associated with stored food products*. Ministry of Agriculture and Fisheries, H. M. Stationary Office, London, 168 pp.
- Hughes, A.M. (1961) *The mites of stored food*. Ministry of Agriculture, Fishery, and Food. Technical Bulletin, First Edition, London, 9: 287 pp.
- Jafari, S., Fathipour, Y. & Faraji, F. (2011) Redescriptions of *Amblyseius meghriensis* Arutunjan and *Typhlodromus haiastanius* (Arutunjan) with discussion on using preanal pores as a character in the subgenus, *Anthoseius* (Mesostigmata: Phytoseiidae). *International Journal of Acarology*, 37(3): 244–254. DOI: [10.1080/01647954.2010.514288](https://doi.org/10.1080/01647954.2010.514288)
- Karg, W. (1960) Zur Kenntnis der Typhlodromiden (Acarina, Parasitiformes) aus Acker- und Grünlandböden. *Zeitschrift für Angewandte Entomologie*, 47: 440–452. DOI: [10.1111/j.1439-0418.1960.tb02848.x](https://doi.org/10.1111/j.1439-0418.1960.tb02848.x)

- Karg, W. (1970) Neue Arten der Raubmilbenfamilie Phytoseiidae Berlese, 1916 (Acarina: Parasitiformes). *Deutsche Entomologische Zeitschrift N. F.*, 17: 289–301. DOI: [10.1002/mmnd.4810170402](https://doi.org/10.1002/mmnd.4810170402)
- Karg, W. (1971) *Acari (Acarina), Milben, Unterordnung Anactinochaeta (Parasitiformes): Die freilebenden Gamasina (Gamasides), Raubmilben. Die Tierwelt Deutschland und der angrenzenden Meeresteile*, 59. Teil, VEB Gustav Fischer Verlag, Jena, Germany, 475 pp.
- Karg, W. (1975) Nutzlingsschonende Spinnmilbenbekämpfung im Obstbau. *Gartenbau*, 22: 51–54.
- Karg, W. (1977) Zur Kenntnis der Gattung *Amblyseius* Berlese, 1904. *Abhandlungen und Berichte des Naturkundemuseums Görlitz*, 51(6): 1–9.
- Karg, W. (1982) Diagnostic and systematics of predatory mites of the family Phytoseiidae Berlese in orchards. *Zoologische Jahrbücher Abteilung für Systematik, Geographie und Biologie der Tiere*, 109: 188–210.
- Karg, W. (1983) Systematische untersuchung der Gattungen und Untergattungen der Raubmilben familie Phytoseiidae Berlese, 1916, mit der beschreibung von 8 neuen Arten. *Mitteilungen aus dem Zoologischen Museum in Berlin*, 59(2): 293–328. DOI: [10.1002/mmnz.4830590203](https://doi.org/10.1002/mmnz.4830590203)
- Karg, W. (1989) Neue Raubmilbenarten der Gattung *Propriozeiopsis* Muma, 1961 (Acarina, Parasitiformes) mit Bestimmungsschlüsseln. *Zoologische Jahrbücher Abteilung für Systematik, Geographie und Biologie der Tiere*, 116(2): 199–216.
- Karg, W. (1991) Die Raubmilbenarten der Phytoseiidae Berlese (Acarina) Mitteleuropas sowie angrenzender Gebiete. *Zoologische Jahrbücher Abteilung für Systematik, Geographie und Biologie der Tiere*, 118(1): 1–64.
- Karg, W. (1993) *Acari (Acarina), Milben Parasitiformes (Anactinochaeta) Cohors Gamasina Leach. Raubmilbe. Die Tierwelt Deutschlands: 59, Second Edition, Gustav Fischer Verlag, Jena, Germany, 523 pp.*
- Kasap, I. & Çobanoğlu, S. (2009) Phytoseiid mites of Hakkâri province, with *Typhlodromus (Anthoseius) tamaricis* Kolodochka, 1982 (Acari: Phytoseiidae), a new record for the predatory mite fauna of Turkey. *Türk Zooloji Dergisi*, 33: 301–308. DOI: [10.3906/zoo-0805-9](https://doi.org/10.3906/zoo-0805-9)
- Kazemi, S., Mohammad-Doustaresharaf, M. & Döker, I. (2022) An annotated checklist of the Iranian Phytoseiidae (Acari: Mesostigmata), with an updated key to the species. *Systematic and Applied Acarology*, 27(4): 697–748. DOI: [10.11158/saa.27.4.6](https://doi.org/10.11158/saa.27.4.6)
- Koch, C.L. (1839) *Deutschlands Crustaceen, Myriapoden und Arachniden*. Regensburg, Germany, 5–6(25): 22; 5–6 (27): 6, 13.
- Kolodochka, L.A. (1973) Predaceous phytoseiid mites (Parasitiformes: Phytoseiidae) from the forest steppe of the Ukrainian SSR. Part I. Species of the genus *Amblyseius*. *Vestnik Zoologii*, 5: 78–81.
- Kolodochka, L.A. (1982) New phytoseiid mites (Parasitiformes: Phytoseiidae) from Turkmen. *Vestnik Zoologii*, 6: 7–13.
- Kolodochka, L.A. (1998) Two new tribes and the main results of a revision of Palearctic phytoseiid mites (Parasitiformes, Phytoseiidae) with the family system concept. *Vestnik Zoologii*, 32(1–2): 51–63.
- Kolodochka, L.A. (2006) Phytoseiid mites of the Palaearctic Region (Parasitiformes, Phytoseiidae): faunistic, taxonomy, ecomorphology, evolution. *Vestnik Zoologii*, 21: 1–250.
- Kolodochka, L.A. (2018) Two new species of the genus *Neoseiulus* (Parasitiformes, Phytoseiidae) with redescriptions of *N. bicaudus* and *N. micmac* based on holotypes. *Vestnik Zoologii*, 52(4): 295–306. DOI: [10.2478/vzoo-2018-0031](https://doi.org/10.2478/vzoo-2018-0031)

- Kreiter, S., Amiri, K., Douin, M., Bohinc, T., Trdan, S. & Tixier, M.-S. (2020a) Phytoseiid mites of Slovenia (Acari: Mesostigmata): new records and first description of the male of *Amblyseius microorientalis*. *Acarologia*, 60(2): 203–242. DOI: [10.24349/acarologia/20204364](https://doi.org/10.24349/acarologia/20204364)
- Kreiter, S., Payet, R.-M., Douin, M., Fontaine, O., Fillâtre, J. & Le Bellec, F. (2020b) Phytoseiidae of La Réunion Island (Acari: Mesostigmata): three new species and two males described, new synonymies, and new records. *Acarologia*, 60(1): 111–195. DOI: [10.24349/acarologia/20184273](https://doi.org/10.24349/acarologia/20184273)
- Kreiter, S., Vicente, V., Tixier, M.-S. & Fontaine, O. (2016a) An unexpected occurrence of *Amblyseius swirskii* Athias-Henriot in La Reunion Island (Acari: Phytoseiidae). *Acarologia*, 56(2): 175–181. DOI: [10.1051/acarologia/20162254](https://doi.org/10.1051/acarologia/20162254)
- Kreiter, S., Vicente, V., Tixier, M.-S., Fontaine, O., Avril, I., Cottineau, J.-S. & Fillâtre, J. (2016b) Présence inattendue d'*Amblyseius swirskii* Athias-Henriot à l'Île de La Réunion. *Phytoma-La santé des végétaux*, 695: 38–42.
- Liao, J.-R., Ho, C.-C. & Ko, C.-C. (2021b) Survey of phytoseiid mites (Acari: Mesostigmata) in the Penghu Islands with two new records and descriptions of two new species. *Systematic and Applied Acarology*, 26(4): 641–671. DOI: [10.11158/saa.26.4.1](https://doi.org/10.11158/saa.26.4.1)
- Lindquist, E.E. (1994) Some observations on the chaetotaxy of the caudal body region of gamasine mites (Acari: Mesostigmata), with a modified notation for some ventrolateral body setae. *Acarologia*, 35: 323–326.
- Lindquist, E.E. & Evans, G.W. (1965) Taxonomic concepts in the Ascidae, with a modified setal nomenclature for the idiosoma of the Gamasina. *Memoirs of the Entomological Society of Canada*, 47: 55–66. DOI: [10.4039/entm9747fv](https://doi.org/10.4039/entm9747fv)
- Louni, M., Jafari, S. & Shakarami, J. (2016) The effect of temperature on the functional response and prey consumption of *Phytoseius plumifer* (Phytoseiidae) fed on *Rhyncaphytoptus ficifoliae* (Diptilomiopidae). *Plant Pest Research*, 6(1): 71–83.
- McGregor, E.A. (1954) Two new mites in the genus *Typhlodromus* (Acarina: Phytoseiidae). *Southern California Academy of Science Bulletin*, 53: 89–92.
- Meshkov, Yu.I. (1991) *Euseius amissibilis* sp. n. (Parasitiformes, Phytoseiidae), a new species of mite from Tadjikistan. *Zoologicheskii Zhurnal*, 70: 138–140.
- Moraes, G.J. de, McMurtry, J.A. & Yaninek, J.S. (1989) Some phytoseiid mites (Acari, Phytoseiidae) from tropical Africa with description of a new species. *International Journal of Acarology*, 15(2): 95–102. DOI: [10.1080/01647958908683830](https://doi.org/10.1080/01647958908683830)
- Moraes, G.J. de, McMurtry, J.A. & Denmark, H.A. (1986) *A catalog of the mite family Phytoseiidae. References to taxonomy, synonymy, distribution and habitat*. EMBRAPA-DDT, Brasilia, Brazil, 353 pp.
- Moraes, G.J. de, McMurtry, J.A., Denmark, H.A. & Campos, C.B. (2004) A revised catalog of the mite family Phytoseiidae. *Zootaxa*, 434: 1–494. DOI: [10.11646/zootaxa.434.1.1](https://doi.org/10.11646/zootaxa.434.1.1)
- Moraes, G.J. de, Kreiter, S. & Lofego, A.C. (2000) Plant mites (Acari) of the French Antilles. 3. Phytoseiidae (Gamasida). *Acarologia*, 40(3): 237–264.
- Muma, M.H. (1961) Subfamilies, genera, and species of Phytoseiidae (Acarina: Mesostigmata). *Florida State Museum Bulletin, USA*, 5(7): 267–302.
- Muma, M.H. (1967) New Phytoseiidae (Acarina: Mesostigmata) from southern Asia. *The Florida Entomologist*, 50: 267–280. DOI: [10.2307/3493156](https://doi.org/10.2307/3493156)
- Muma, M.H. & Denmark, H.A. (1970) *Phytoseiidae of Florida. Arthropods of Florida and neighboring land areas*, 6. Florida Department of Agriculture and Consumer Services, Division of Plant Industry, Gainesville, USA, 150 pp.

- Nazari, M., Hajizadeh J. & Noei, J. (2011) Twelve species of Phytoseiidae (Acari: Mesostigmata) from citrus orchards of Guilan Province, Iran. In: Kazemi, S. & Saboori, A. (Eds.), *Proceedings of the First Persian Congress of Acarology*. 22–23 December 2011, International Center for Science, High Technology & Environmental Sciences, Kerman, Iran, 34 pp.
- Nesbitt, H.H.J. (1951) A taxonomic study of the Phytoseiinae (Family Laelaptidae) predaceous upon Tetranychidae of economic importance. *Zoologische Verhandelingen*, 12: 1–96.
- Okassa, M., Tixier, M.-S., Cheval, B. & Kreiter, S. (2009) Molecular and morphological evidence for a new species status within the genus *Euseius* (Acari: Phytoseiidae). *Canadian Journal of Zoology*, 87: 689–698. DOI: [10.1139/Z09-057](https://doi.org/10.1139/Z09-057)
- Oliveira, D.C., Charanasri, V., Kongchuensin, M., Konvipasruang, P., Chandrapatya, A. & Moraes G.J. de (2012) Phytoseiidae of Thailand (Acari: Mesostigmata), with a key for their identification. *Zootaxa*, 3453: 1–24. DOI: [10.11646/zootaxa.3453.1.1](https://doi.org/10.11646/zootaxa.3453.1.1)
- Ostovan, H., Faraji, F., Kamyab, F. & Khadempour F. (2012) Notes on *Neoseiulus paspalivorus* (De Leon) and *Proprioseiopsis messor* (Wainstein) (Acari: Phytoseiidae) collected in Iran. *Acarologia*, 52(1): 51–58. DOI: [10.1051/acarologia/20122032](https://doi.org/10.1051/acarologia/20122032)
- Oudemans, A.C. (1905) Acarologische Aanteekeningen, XIX. *Entomologische Berichten*, 2(25): 4–12.
- Panahi, L., H., Askarianzadeh, A. & Jalaeian, M. (2014) Phytoseiid mites (Acari: Phytoseiidae) of fruit orchards in cold regions of Razavi Khorasan province (northeast Iran), with redescription of two species. *Persian Journal of Acarology*, 3(1): 27–40.
- Prasad, V. (1968) *Amblyseius* mites from Hawaii. *Annals of the Entomological Society of America*, 61(6): 1514–1521. DOI: [10.1093/aesa/61.6.1514](https://doi.org/10.1093/aesa/61.6.1514)
- Pritchard, A.E. & Baker, E.W. (1962) Mites of the family Phytoseiidae from Central Africa, with remarks on the genera of the world. *Hilgardia*, 33(7): 205–309. DOI: [10.3733/hilg.v33n07p205](https://doi.org/10.3733/hilg.v33n07p205)
- Ragusa, S. & Athias-Henriot, C. (1983) Observations on the genus *Neoseiulus* Hughes (Parasitiformes, Phytoseiidae). Redefinition. Composition. Geography. Description of two new species. *Revue Suisse de Zoologie*, 90(3): 657–678. DOI: [10.5962/bhl.part.82005](https://doi.org/10.5962/bhl.part.82005)
- Rahmani, H., Kamali, K. & Faraji, F. (2010) Predatory mite fauna of Phytoseiidae of northwest Iran (Acari: Mesostigmata). *Turkish Journal of Zoology*, 34(4): 497–508. DOI: [10.3906/zoo-0902-23](https://doi.org/10.3906/zoo-0902-23)
- Rasmy, A. & El-Banhawy, E.M. (1974a) Behaviour and bionomics of the predatory mite, *Phytoseius plumifer* (Acarina: Phytoseiidae) as affected by physical surface features of host plants. *Entomophaga*, 19: 255–257. DOI: [10.1007/BF02371050](https://doi.org/10.1007/BF02371050)
- Rasmy, A. & El-Banhawy, E.M. (1974b) The phytoseiid mite *Phytoseius plumifer* as a predator of the eriophyid mite *Aceria fiats* (Acarina). *Entomophaga*, 19(3): 255–257. DOI: [10.1007/BF02371050](https://doi.org/10.1007/BF02371050)
- Rasmy, A. & El-Banhawy, E.M. (1975) Biology and predatory efficiency of two phytoseiid mites as affected by long term pollen feeding. *Entomophaga*, 20(1): 93–95. DOI: [10.1007/BF02373454](https://doi.org/10.1007/BF02373454)
- Rhodes, L.M. & Liburd, O.E. (2006) Evaluation of predatory mites and Acramite for control of twospotted spider mites in strawberries in north central Florida. *Journal of Economic Entomology*, 99(4): 1291–1298. DOI: [10.1093/jee/99.4.1291](https://doi.org/10.1093/jee/99.4.1291)
- Ribaga, C. (1904) Gamasidi planticoli. *Rivista Patologia Vegetale*, 10: 175–178.
- Rivnay, T. & Swirski, E. (1980) Four new species of phytoseiid mites (Acarina: Mesostigmata) from Israel. *Phytoparasitica*, 8: 173–187. DOI: [10.1007/BF03158314](https://doi.org/10.1007/BF03158314)
- Rodriguez-Reina, J.M., Garcia-Mari, F. & Ferragut, F. (1992) Predatory activity of phytoseiid mites on different developmental stages of the Western flower thrips *Frankliniella occidentalis*. *Bolletín Sanidad Vegetal Plagas*, 18: 253–263.

- Rowell, H.J., Chant, D.A. & Hansell, R.I.C. (1978) The determination of setal homologies and setal patterns on the dorsal shield in the family Phytoseiidae. *Canadian Entomologist*, 110: 859–876. DOI: [10.4039/Ent110859-8](https://doi.org/10.4039/Ent110859-8)
- Ryu, M.O., Lee, W.K. & Cho, S.R. (2001) Phytoseiid mites (Acari: Phytoseiidae) from the pear field of Naju District in Korea. *Korean Journal of Soil Zoology*, 6(1–2): 7–9.
- Salmane, I. (1999) Soil free-living predatory Gamasina mites (Acari, Mesostigmata) from the coastal meadows of Riga Gulf, Latvia. *Latvijas Entomologs*, 37: 104–114.
- Scheuten, A. (1857) Einiges uber Milben. *Archiv für Naturgeschichte*, 23: 104–112.
- Schicha, E. (1978) Two new *Typhlodromus* from Australia and *T. caudiglans* Schuster redescribed (Acari: Phytoseiidae). *Acarologia*, 10(3): 317–326.
- Schicha, E. (1979) Three new species of *Amblyseius* Berlese (Acarina: Phytoseiidae) from Australia. *Proceedings of the Linnean Society of New South Wales*, 103: 217–226.
- Schicha, E. (1981) A new species of *Amblyseius* (Acari: Phytoseiidae) from Australia compared with ten closely related species from Asia, America and Africa. *International Journal of Acarology*, 7: 203–216. DOI: [10.1080/01647958108683262](https://doi.org/10.1080/01647958108683262)
- Schicha, E. (1987) *Phytoseiidae of Australia and neighboring areas*. Indira Publishing House, West Bloomfield, Michigan, USA, 187 pp.
- Schicha, E. & Corpuz-Raros, L.A. (1992) *Phytoseiidae of the Philippines*. Indira Publishing House, West Bloomfield, Michigan, USA, 190 pp.
- Schuster, R.O. (1959) A new species of *Typhlodromus* near *T. bakeri* (Garman) and a consideration of the occurrence of *T. rhenanus* in California. *Proceedings of the Entomological Society of Washington*, 61(2): 88–90.
- Schuster, R.O. & Pritchard, A.E. (1963) Phytoseiid mites of California. *Hilgardia*, 34: 191–285. DOI: [10.3733/hilg.v34n07p191](https://doi.org/10.3733/hilg.v34n07p191)
- Specht, H.B. (1968) Phytoseiidae (Acarina: Mesostigmata) in the New Jersey apple orchard environment with descriptions of spermathecae and three new species. *Canadian Entomologist*, 100: 673–692. DOI: [10.4039/Ent100673-7](https://doi.org/10.4039/Ent100673-7)
- Stathakis, T.I., Kapaxidi, E.V. & Papadoulis, G.T. (2016) A new species and three new records of Phytoseiidae (Acari: Mesostigmata) found on coastal and wetland vegetation in Greece. *Systematic and Applied Acarology*, 21: 567–582. DOI: [10.11158/saa.21.5.2](https://doi.org/10.11158/saa.21.5.2)
- Szabó, A., Gál, C. & Péntzes, B. (2013) The occurrence of predatory mites in the Kunsza'g wine region in Hungary. *Növényvéd.*, 49: 193–197.
- Tixier, M.-S., Auger, P., Migeon, A., Douin, M., Fossoud, A., Navajas, M. & Arabuli, T. (2021) Integrated taxonomy supports the identification of some species of Phytoseiidae (Acari: Mesostigmata) from Georgia. *Acarologia*, 61(4): 824–844. DOI: [10.24349/m2Rp-WodG](https://doi.org/10.24349/m2Rp-WodG)
- Tixier, M.-S., Guichou, S. & Kreiter, S. (2008) Morphological variation in the biological control agent *Neoseiulus californicus* (McGregor) (Acari: Phytoseiidae): consequences for diagnostic reliability and synonymies. *Invertebrate Systematics*, 22: 453–469. DOI: [10.1071/IS07052](https://doi.org/10.1071/IS07052)
- Tixier, M.-S., Kreiter, S., Okassa, M. & Cheval, B. (2010) A new species of the genus *Euseius* Wainstein (Acari: Phytoseiidae) from France. *Journal Natural History*, 44(3–4): 241–254. DOI: [10.1080/00222930903383529](https://doi.org/10.1080/00222930903383529)
- Tixier, M.-S., Lopes, I., Blanc, G., Dedieu, J.L. & Kreiter S. (2014) Phytoseiid mite diversity (Acari: Mesostigmata) and assessment of their spatial distribution in French apple orchards. *Acarologia*, 54(1): 97–111. DOI: [10.1051/acarologia/20142114](https://doi.org/10.1051/acarologia/20142114)
- Tixier, M.-S., Tsolakis, H., Ragusa, S., Poiso, A., Ferrero, M., Okassa, M. & Kreiter, S. (2011) Integrative taxonomy demonstrates the unexpected synonymy between two predatory mite

- species: *Cydnodromus idaeus* and *C. picanus* (Acari: Phytoseiidae). *Invertebrate Systematics*, 25: 273–281.
- Tixier, M.-S., dos Santos Vicente, V., Douin, M., Duso, C. & Kreiter, S. (2017) Great molecular variation within the species *Phytoseius finitimus* (Acari: Phytoseiidae): implications for diagnosis decision within the mite family Phytoseiidae. *Acarologia*, 57(3): 493–515. DOI: [10.24349/acarologia/20174168](https://doi.org/10.24349/acarologia/20174168)
- Ueckermann, E.A. & Loots, G.C. (1988) *The African species of the subgenera Anthoseius De Leon and Amblyseius Berlese (Acari: Phytoseiidae)*. Entomological Memoirs, Department of Agriculture and Water Supply, Republic of South Africa, 73: 168 pp.
- van der Merwe, G.G. (1965) South African Phytoseiidae (Acarina). I. Nine new species of the genus *Amblyseius* Berlese. *Journal of the Entomological Society of South Africa*, 28: 57–76.
- van der Merwe, G.G. (1968) A taxonomic study of the family Phytoseiidae (Acari) in South Africa with contributions to the biology of two species. *Entomological Memoirs, Department of Agriculture and Water Supply, Republic of South Africa*, 18: 1–198.
- Vitzthum, H. von (1941) Acarina. In: Bronns, H.G. (Ed.), *Klassen und Ordnungen des Tierreichs 5*. Akademischer Verlag, Leipzig, Germany, pp. 764–767.
- Wainstein, B.A. (1959) New subgenus and species of the genus *Phytoseius* Ribaga, 1902 (Phytoseiidae: Parasitiformes). *Zoologicheskii Zhurnal*, 38: 1361–1365.
- Wainstein, B.A. (1960) New species and subspecies of the genus *Typhlodromus* Scheuten (Parasitiformes, Phytoseiidae) of the USSR fauna. *Zoologicheskii Zhurnal*, 39: 683–690.
- Wainstein, B.A. (1961) New species of mites of the genus *Typhlodromus* (Parasitiformes: Phytoseiidae) in Georgia. *Trudy Instituta Zoologii Akademii Nauk Gruzinskoy SSR*, 18: 153–162.
- Wainstein, B.A. (1962) Some new predatory mites of the family Phytoseiidae (Parasitiformes) of the USSR fauna. *Entomologicheskoe Obozrenie*, Russia, 41: 230–240; *Entomological Review*, 41: 139–146.
- Wainstein, B.A. (1972) New species and subgenus of the genus *Anthoseius* (Parasitiformes, Phytoseiidae). *Zoologicheskii Zhurnal*, 51: 1477–1482.
- Wainstein, B.A. (1975) Predatory mites of the family Phytoseiidae (Parasitiformes) of Yaroslavl Province. *Entomologicheskoe Obozrenie*, 54(4): 914–922 (In Russian); *Entomological Review*, 54(4): 138–143.
- Wainstein, B.A. (1976) A new tribe of the family Phytoseiidae (Parasitiformes). *Zoologicheskii Zhurnal*, 55: 696–700.
- Wainstein, B.A. & Arutunjan, E.S. (1967) New species of predaceous mites of the genera *Typhlodromus* Scheuten and *Paraseiulus* Muma (Parasitiformes, Phytoseiidae). *Zoologicheskii Zhurnal*, 46: 1764–1770.
- Wainstein, B.A. & Arutunjan, E.S. (1968) New species of predaceous mites of the genus *Typhlodromus* (Parasitiformes: Phytoseiidae). *Zoologicheskii Zhurnal*, 47: 1240–1244.
- Wainstein, B.A. & Vartapetov, S.G. (1973) Predatory mites of the family Phytoseiidae (Parasitiformes) of Adzharskaya ASSR. *Akademiya Nauk Armyanskoy SSR, Biologicheskii Zhurnal Armenii*, 26(2): 102–105.
- Walter, D.E. & Krantz, G.W. (2009) Collecting, rearing and preparing specimens. In: Krantz, G.W. & Walter, D.E. (Eds.), *A manual of acarology*. 3rd ed. Texas Tech University Press, Lubbock, pp. 83–96.
- Wu, W.N. & Lan, W.M. (1991) Five new species and one new record of *Amblyseius* from northwest China (Acari: Mesostigmata: Phytoseiidae). *Acta Zootaxonomica Sinica*, 16(3): 313–319.

- Wu, W.N., Ou, J.F. & Huang, J.L. (2009) *Fauna Sinica, Invertebrate Vol. 47, Arachnida, Acari, Phytoseiidae*. Beijing: Science Press, 511 pp.
- Zaher, M.A. (1986) *Predaceous and nonphytophagous mites (Nile Valley and Delta)*. Text. Survey and ecological studies on phytophagous, predaceous and soil mites in Egypt. PL 480 Programme USA, Project EG_ARS_30, Grant No. FG_EG_139, Egypt, 567 pp.
- Zaher, M.A., Wafa, A.K. & Shehata, K.K. (1969) Life history of the predatory mite *Phytoseius plumifer* and the effect of nutrition on its biology (Acarina: Phytoseiidae). *Entomologia Experimentalis et Applicata*, 12: 383–388. DOI: [10.1111/j.1570-7458.1969.tb02534.x](https://doi.org/10.1111/j.1570-7458.1969.tb02534.x)
- Zannou, I.D. & Hanna, R. (2011) Clarifying the identity of *Amblyseius swirskii* and *Amblyseius rykei* (Acari: Phytoseiidae): are they two distinct species or two populations of one species? *Experimental and Applied Acarology*, 53: 339–347. DOI: [10.1007/s10493-010-9412-6](https://doi.org/10.1007/s10493-010-9412-6)
- Zannou, I.D., Moraes, G.J. de, Ueckermann, E.A., Oliveira, A.R., Yaninek, J.S. & Hanna, R. (2006) Phytoseiid mites of the genus *Neoseiulus* Hughes (Acari: Phytoseiidae) from subSaharan Africa. *International Journal of Acarology*, 32(3): 241–276. DOI: [10.1080/01647950608684467](https://doi.org/10.1080/01647950608684467)
- Zhang, Z.-Q. (2003) *Mites of Greenhouses: Identification, Biology & Control*. CABI Publishing, UK, 244 pp.

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کنه‌های خانواده *Phytoseiidae* (Acari: Mesostigmata) در چهار استان ایران

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چکیده

پژوهش حاضر نتایج بررسی‌های انجام شده طی دو سال (۱۳۹۷ و ۱۳۹۹) در چهار استان گیلان، خراسان رضوی، مازندران و سیستان و بلوچستان را گزارش می‌دهد. بیست و سه گونه از هشت جنس از خانواده *Phytoseiidae* جمع آوری شد که دو گونه *Euseius gallicus* و *Proprioseiopsis lineatus* برای نخستین بار از ایران گزارش می‌شوند. سه گونه *Neoseiulus agrestis*، *Amblyseius obtusus* و *Neoseiulus californicus* *Typhlodromus (Anthoseius) haiastanius* گزارش جدیدی برای استان گیلان هستند. گونه‌های *Neoseiulus californicus* و *Amblyseius swirskii* گزارش جدید برای استان مازندران و گونه *Typhlodromus (Anthoseius) haiastanius* گزارش جدیدی برای استان خراسان رضوی است. تمامی گونه‌های جمع آوری شده در سیستان و بلوچستان گزارش جدیدی برای این استان است. پراکنش جهانی و میزبان‌های گیاهی تمام فیتوزئیدهای جمع آوری شده در طول این مطالعه ارایه شده است.

واژگان کلیدی: *Euseius gallicus*، فیتوزئیدها، *Proprioseiopsis lineatus*، بررسی، آرایه‌شناسی.

اطلاعات مقاله: تاریخ دریافت: ۱۴۰۱/۷/۱۱، تاریخ پذیرش: ۱۴۰۱/۹/۱۰، تاریخ چاپ: ۱۴۰۱/۱۰/۲۵