Acarologia is proudly non-profit, with no page charges and free open access

Please help us maintain this system by encouraging your institutes to subscribe to the print version of the journal and by sending us your high quality research on the Acari.

Subscriptions: Year 2021 (Volume 61): 450 €
http://www1.montpellier.inra.fr/CBGP/acarologia/subscribe.php
Previous volumes (2010-2020): 250 € / year (4 issues)
Acarologia, CBGP, CS 30016, 34988 MONTFERRIER-sur-LEZ Cedex, France
ISSN 0044-586X (print), ISSN 2107-7207 (electronic)

The digitalization of Acarologia papers prior to 2000 was supported by Agropolis Fondation under the reference ID 1500-024 through the « Investissements d’avenir » programme (Labex Agro: ANR-10-LABX-0001-01)

Acarologia is under free license and distributed under the terms of the Creative Commons-BY.
First records of Phytoseiidae (Acari: Mesostigmata) from one island of the Comoros Archipelago

Serge Kreiter\textsuperscript{a}, Rose-My Payet\textsuperscript{b}, Jacques Fillâtre\textsuperscript{c}, Hamza Abdou Azali\textsuperscript{d}

\textsuperscript{a} CBGP, Montpellier SupAgro, INRA, CIRAD, IRD, Univ Montpellier, Montpellier, France.
\textsuperscript{b} CIRAD, UPR Hortsys, Station de Bassin-Plat, 97410, Saint-Pierre, Réunion, France.
\textsuperscript{c} Armelilor, 1 Chemin de l’IRFA, 97410 Saint-Pierre, Réunion, France.
\textsuperscript{d} INRAPE, Moroni, Grande Comore, Union des Comores.

ABSTRACT

The Comoros Archipelago is constituted of four islands. These islands are located in the North Mozambique Channel in the Indian Ocean, one of the world’s hotspots of biodiversity. Despite this status of hotspot, only one species of Phytoseiidae was known from this Archipelago, from Mayotte: \textit{Phytoseius mayottae}. No species were recorded from the three other main islands. We report in this paper the results of a preliminary survey in Great Comoro or “Grande Comore” Island also called Ngazidja in the Comorian language (= Shikomori) with five species recorded.

Keywords  Survey, collection, taxonomy, systematics, Grande Comore

Zoobank  http://zoobank.org/BABDD080-D2D0-46F6-8172-442298192D42

Introduction

Several species in the family Phytoseiidae are important natural enemies controlling phytophagous mite and small insects in natural areas and crops all around the world (McMurtry and Croft 1997; McMurtry et al. 2013). This family is widespread all over the world and consists of 2,479 valid species dispatched in three sub-families and 94 genera (Demite et al. 2017). Most of areas of the Indian Ocean constitute one of the world’s hotspots of biodiversity. The hotspot of biodiversity concept was defined by Myers (1988) in order to identify the most immediately important areas for conservation of biodiversity. These hotspots hold high endemism levels and have lost at least 70% of their original natural vegetation (Myers et al. 2000). The characterization of the phytoseiid mite diversity in these areas is thus contributing to this general topic of conservation.

Located in the Indian Ocean in the North of Mozambique Channel, Comoros Archipelago is constitutes of four islands: “Grande Comore” called also Ngazidja in Comorian language (= Shikomori), Mohéli called also Mweli, Anjouan called also Nzouani, and Mayotte called also Maoré. The climate of the Comoros Archipelago, south of the Equator, is tropical, with a hot and rainy season from December to April, and a relatively cool and dry season from May to November. The average daily temperature goes from around 27°C in the warmest period (January to April), to around 23°C in the coolest months (July, August and September). The two smaller islands (Mohéli and Anjouan) are covered by hills in the interior, while Grande Comore has the volcano Karthala, 2,360 meters high. This main island is the rainiest. On Mount Karthala, even 5,000 mm of rain / year fall, while the capital Moroni, which is located on the windward side receives 2,700 mm of rain / year. On the Comoros there are numerous tropical ecosystems that are primarily dependent on the altitude. Many kinds of tropical plants can be found, large numbers of which are endemic. Like most islands, the diversity of the local
flora suffers from two pressures, on one hand the reduction of available space caused by the reduction of biotopes due to the invasion of humans in wildest areas and on the other hand, the invasion of exotic plant species such as guava trees.

Presently, only one species of Phytoseiidae is known from this part of the world, from Mayotte: *Phytoseius mayottae* Schicha. This species was collected by Jean Gutierrez and described by Schicha (1984). No species are recorded from the three other islands.

We report in this paper result of a preliminary survey in Grande Comore Island (Ngazidja).

**Material and methods**

The survey took place in “Grande Comore” (or Ngazidja) in February 2017. Plant inhabiting mites were collected for this preliminary survey only from various crops in two locations. Mites were directly collected from leaves with a fine brush and then transferred into small plastic vials containing 70% and 98% ethanol. Plant species were identified by Jacques Fillâtre (Armeflhor).

Mites in vials with 70% ethanol were then all mounted on slides using Hoyer’s medium and all identified using a phase and interferential contrast microscope (Leica DMLB, Leica Microsystèmes SAS, Nanterre, France). Mites in vials with 98% ethanol will be used for barcoding (in progress).

Morphological characters were measured using a graduate eyepiece (Leica, see above). Chant and McMurtry’s (1994, 2007) concepts of the taxonomy for the family Phytoseiidae and the world catalogue database of Demite *et al.* (2017) were used for faunistic and biogeographical aspects. The chaetotaxy terminologies used in this paper followed those proposed by Lindquist and Evans (1965) as adapted by Rowell *et al.* (1978) for Phytoseiidae for dorsal and by Chant and Yoshida-Shaul (1991) for ventral idiosomal setae, respectively. Adenotaxy and poroidotaxy terminologies are those proposed by Athias-Henriot (1975).

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 should be considered as absent.

All measurements are given in micrometers (μm) and presented as the mean in bold followed by the range in parenthesis. All individuals collected were measured.

Specimens of each species are deposited in the mite collections of Montpellier SupAgro conserved in UMR CBGP INRA/IRD/CIRAD/SupAgro.

The following abbreviations are used in this paper for morphological characters: **dsl** = dorsal shield length; **dsw** = dorsal shield width; **lisl** = Largest inguinal sigilla (= “metapodal plate”) length; **lisw** = Largest inguinal sigilla (= “metapodal plate”) width; **sisl** = smallest inguinal sigilla(= “metapodal plate”) length; **vsl** = ventrianal shield length (or ventral shield length for *Iphiseiurus degenerans*); **asl** = anal shield length; **vsw ZV2 and vsw anus** = ventrianal shield width at ZV2 level and at anus level; **scel** = spermatheca cervix length; **scw** = spermatheca cervix width; **fdl** = fixed digit length; **mdl** = movable digit length.

The following abbreviations are used in this paper for institutions: **Armeflhor** = Association Réunionnaise pour la Modernisation de l’Economie Fruitière, Légumières et HORticole; **CBGP** = Centre de Biologie pour la Gestion des Populations; **CIRAD** = Centre International de Recherche Agronomique pour le Développement; **INRA** = Institut National de la Recherche Agronomique; **INRAPE** = Institut National de Recherche pour l’Agriculture, la Pêche et l’Environnement; **IRD** = Institut de Recherche pour le Développement; **MSA** = Montpellier SupAgro, France; **UMR** = Unité Mixte de Recherche; **UPR** = Unité Propre de Recherche.
Results and discussion

A total of five species have been collected and identified, four species of the sub-family Amblyseiinae and one species of the sub-family Phytoseiinae. Three of them are biological control agents, may have great interest for agriculture of this part of the world and some data from the literature are provided here.

Subfamily Amblyseiinae Muma

Amblyseiinae Muma, 1961: 273.

Tribe Amblyseiini Muma

Amblyseiini, Muma, 1961: 68.

Subtribe Amblyseiina Muma

Amblyseiina Muma, 1961: 69.

Genus Amblyseius Berlese

Amblyseius Berlese, 1914: 143.

Amblyseius herbicolus (Chant)

Typhlodromus (Amblyseius) herbicolus Chant, 1959: 84; Amblyseius (Amblyseius) herbicolus, Muma 1961: 287; Typhlodromus herbicolus, Hirschmann, 1962: 23; Amblyseius herbicolus, Moraes et al., 1986: 14; 1989: 79; 2004: 27; Chant & McMurtry, 2004: 209; 2007: 78; Amblyseius deleoni Muma & Denmark, 1970: 68 (synonymy according to Daneshvar & Denmark, 1982; Denmark & Muma 1989); Amblyseius giganticus Gupta, 1981: 33 (synonymy according to Gupta, 1986); Amblyseius impactus Chaudhri, 1968, 553 (synonymy according to Daneshvar & Denmark, 1982; Denmark & Muma, 1989); Amblyseius (Amblyseialus) thermophilus Karg, 1991: 12 (synonymy according to El-Banhawy & Knapp, 2011 and to Demite et al., 2017); Typhlodromus (Amblyseius) amitae Bhattacharyya, 1968: 677 (synonymy according to Denmark & Muma, 1989).

Amblyseius herbicolus (Chant) is the second most abundant phytoseiid mites on coffee plants (Coffea arabica L.) in Brazil, associated with Brevipalpus phoenicis (Geijskes) (Acari: Tenuipalpidae), vector of the coffee ring spot virus. Amblyseius herbicolus was found to be an efficient predator of the coffee ring spot mite (Reis et al. 2007).

Amblyseius herbicolus is also found associated with the broad mite, Polyphagotarsonemus latus Banks in crops such as chili pepper (Capsicum annuum L.) in Brazil. This species has also a good potential for controlling P. latus. Rodríguez-Cruz et al. (2013) have studied biological, reproductive and life table parameters of A. herbicolus on three different diets: broad mites, castor bean pollen (Ricinus communis L.) and sunn hemp pollen (Crotalaria juncea L.). The predator was able to develop and reproduce on all these three diets. However, its intrinsic growth rate was higher on broad mites and castor bean pollen. Feeding on alternative food such as pollen can facilitate the predator’s mass rearing and maintain its population on crops when prey is absent or scarce. Many polyphagous generalist phytoseiid mites are important natural enemies because they can feed on plant provided pollen and various prey species, and thus persist in crops even in the absence of target pests (McMurtry et al. 2013). Hence, populations
of these predators can be established in a crop by providing alternative food, thus increasing biological control. Alternative food affects \textit{P. latus} control on chilli pepper plants by predatory mites (Duarte \textit{et al.} 2015). \textit{Amblyseius herbicola}us had high oviposition and population growth rates when fed with cattail pollen (\textit{Typha latifolia} L.), chilli pepper pollen and bee-collected pollen, and a low rate on the alternative prey \textit{Tetranychus urticae} Koch. Supplementing pepper plants with pollen resulted in better control of broad mite populations (Duarte \textit{et al.} 2015). Release of \textit{A. herbicola}us on young plants with weekly addition of honeybee pollen or cattail pollen until plants produce flowers seems a viable strategy to sustain populations of this predator (Duarte \textit{et al.} 2015).

Specimens examined — \textbf{Moroni}, Adoudja (long. 11°41′S, lat. 43°15′E, alt. 100 m), 1 ♀ + 1 immature on \textit{Alocasia macrorrhiza} (L.) G. Don (Araceae), 2-02-2017; 1 ♀ + 2 immatures on \textit{Morinda citrifolia} L. (Rubiaceae), 2-02-2017.

Previous record — Large distribution worldwide. This species is mentioned from Mozambique, La Réunion Island, Kenya, Tanzania for the closest places.

Remarks (Table 1) — Measurements of the two females collected fit very well with the measurements reported literature, except for greater dimension of the ventrianal shield and a longer spermatheca for specimens from Grande Comore.

\textbf{Tribe Euseiini Chant and McMurtry}

Euseiini Chant & McMurtry, 2005b: 191.

\textbf{Subtribe Euseiina Chant and McMurtry}

Euseiina Chant & McMurtry, 2005b: 209.

\textbf{Genus \textit{Euseius} Wainstein}

\textit{Amblyseius} (\textit{Amblyseius}) section \textit{Euseius}, Wainstein, 1962: 15; \textit{Euseius} De Leon, 1967: 86.

\textbf{\textit{Euseius baetae} (Meyer & Rodrigues)}

\textit{Amblyseius baetae} (Meyer & Rodrigues, 1966): 28; \textit{Euseius baetae} (Meyer & Rodrigues), Moraes \textit{et al.}, 2001a: 11; Moraes \textit{et al.}, 1986: 37; 2004: 62; Chant & McMurtry 2005b: 215; 2007: 120; El Banhawy & Knapp, 2011: 56; \textit{Euseius kangwanensis} Ueckermann & Loots, 1988: 85 (synonym according to Ueckermann & Loots, 1988; Moraes \textit{et al.}, 2001b; El-Banhawy & Knapp, 2011).

The 200 species of the genus \textit{Euseius} are considered as Type IV species, polliniphagous generalists (McMurtry and Croft 1997; McMurtry \textit{et al.} 2013) and \textit{Euseius baetae} is supposed to belong to that Type IV. The biology of \textit{E. baetae} is however totally unknown.

Specimens examined — \textbf{Mdé}, INRAPE (long. 11°41′S, lat. 43°14′E, alt. 50 m), 1 ♀ on \textit{Manihot esculenta} Crantz (Euphorbiaceae), 2-02-2017; \textbf{Moroni}, Adoudja (long. 11°41′S, lat. 43°15′E, alt. 100 m), 2 ♀♀ on \textit{Plectranthus scutellarioides} (L.) R.Br. (Lamiaceae), 2-02-2017; 1 ♂ on \textit{Alocasia macrorrhizos} (L.) G.Don (Araceae), 2-02-2017.

Previous record — Congo, Kenya, Malawi, Mozambique, South Africa.

Remarks (Table 2) — Measurements of the 4 ♀♀ fit well with the measurements from the literature with slightly shorter dimensions in general.
Table 1: Comparisons of character measurements of female specimens of *Amblyseius herbicolus* collected in different locations (Localities followed by the number of specimens measured between brackets)

| Characters | Grande Comore (2) | Kenya (10) | Various countries (8) | Senegal (2) | Turkey (3) | Holotype (1) |
|------------|-------------------|------------|-----------------------|-------------|------------|-------------|
| Dsl        | 385-428           | 335        | 353 (325-368)         | 360-365     | 313-352    | 369         |
| Dsw        | 263-275           | 190        | 256 (240-274)         | 250-268     | 196-221    | 236         |
| j1         | 40-43             | 32         | 37 (34-40)            | 35-38       | 33-38      | 38          |
| j3         | 53-55             | 37         | 49 (38-58)            | 38-45       | 32-39      | 42          |
| j4         | 6                 | 4-6        | 6 (5-8)               | 6-8         | 8-9        | 9           |
| j5         | 5                 | 4-6        | 4 (3-5)               | 4           | 7-8        | 7           |
| j6         | 5-6               | 4-6        | 7 (5-8)               | 8           | 6-7        | 11          |
| J2         | 8-10              | 4-6        | 10 (8-11)             | 8-9         | 8-9        | 12          |
| J5         | 10                | 4-6        | 8 (6-10)              | 8-10        | 9-10       | 9           |
| z2         | 6-8               | 6          | 11 (8-16)             | 8-9         | 9-12       | 13          |
| z4         | 8                 | 6          | 8 (8-10)              | 10-11       | 8-12       | 9           |
| z5         | 5                 | 6          | 6 (5-6)               | 7-9         | 6-7        | 6           |
| Z1         | 8                 | 10         | 10 (8-13)             | 8-10        | 9-12       | 9           |
| Z4         | 133-135           | 90         | 126 (101-152)         | 163-172     | 91-99      | 110         |
| Z5         | 288-300           | 232        | 281 (251-306)         | 310-345     | 220-251    | 236         |
| s4         | 120-125           | 92         | 113 (98-130)          | 123-135     | 86-96      | 100         |
| S2         | 13                | 10         | 12 (8-14)             | 13-15       | 10-12      | 11          |
| S4         | 13                | 10         | 11 (8-13)             | 8-10        | 9-11       | 13          |
| S5         | 13                | 10         | 9 (8-10)              | 8-10        | 9-10       | 11          |
| r3         | 8-15              | 10         | 14 (11-16)            | 10-11       | 10-16      | 15          |
| R1         | 10-13             | 10         | 9 (8-10)              | 9-10        | 8-9        | 8           |
| st1-st1    | 68                | nr         | not reported          | nr          | nr         | nr          |
| st3-st3    | 73-75             | 62         | 65 (58-70)            | 63-65       | 64-69      |             |
| st2-st2    | 73-75             | 69         | 71 (66-75)            | 75-78       | 70-73      |             |
| st3-st3    | 63-65             | nr         | not reported          | nr          | nr         | nr          |
| st4-st4    | 78-83             | nr         | not reported          | nr          | nr         | nr          |
| st5-st5    | 70-78             | nr         | 71 (67-75)            | 65-70       | 58-64      |             |
| lisl       | 23                | nr         | not reported          | nr          | nr         | nr          |
| lsiw       | 5                 | nr         | not reported          | nr          | nr         | nr          |
| sisl       | 13                | nr         | not reported          | nr          | nr         | nr          |
| vsl        | 120-135           | 108        | 116 (112-118)         | 113-115     | 102-117    | nr          |
| vsw V2     | 63                | 48         | 57 (53-59)            | 65-69       | 44-48      | nr          |
| vsw anus   | 80                | 69         | 71 (66-77)            | 75-78       | 61-69      | nr          |
| JV5        | 80-85             | 52         | not reported          | nr          | 51-60      | nr          |
| SgeI       | 45-48             | nr         | 42 (35-48)            | 43-48       | 40-48      | nr          |
| SgeII      | 38                | 52         | 38 (35-42)            | 38-40       | 34-39      | nr          |
| SgeIII     | 53-58             | 41         | 52 (45-59)            | 48-52       | 41-46      | nr          |
| StI        | 43                | 35         | 41 (34-48)            | 43-45       | 33-40      | nr          |
| SgeIV      | 135               | 110        | 124 (96-158)          | 160-162     | 98-128     | 112         |
| StIV       | 100               | 76         | 90 (67-109)           | 102-15      | 75-89      | 82          |
| StV        | 80                | 65         | 76 (66-86)            | 76-78       | 63-70      | 76          |
| scl        | 38-40             | nr         | 32 (32-35)            | 33-35       | 24-32      | 18          |
| scw        | 2-3               | nr         | not reported          | nr          | nr         | nr          |
| Fdl        | 33                | nr         | 31 (30-31)            | nr          | 29-36      | nr          |
| teeth      | 11-12             | 8          | 10                    | nr          | 12         | 11-12       |
| Mdl        | 30                | nr         | 35 (34-35)            | nr          | 31-33      | nr          |

Data from this study for Grande Comore, from El-Banhawy and Knapp (2011) for Kenya, from Zannou et al. (2007) for various countries of Africa (Benin 1, Burundi 1, Democratic Republic of Congo 1, Ghana 1, Kenya 3, Rwanda 1), from Kade et al. (2011) for Senegal, from Akyasi et al. (2016) for Turkey, from Denmark and Muma (1989) for the holotype intercepted in Massachusetts (Boston) but coming from Portugal. nr = not reported.
Table 2 Comparisons of character measurements of female specimens of *Euseius baetae* collected in different locations (Localities followed by the number of specimens measured between brackets)

| Characters | Grande Comore (4) | Mozambique (4) | South Africa (7) | Congo (1) | Kenya (1) |
|------------|------------------|----------------|-----------------|----------|----------|
| Dsl        | 341 (310-375)    | 322-336        | 337 (343-359)   | 336      | 300      |
| Dsw        | 329 (220-238)    | 201-243        | 252 (224-239)   | 230      | 210      |
| j1         | 28               | 29-38          | 32 (28-32)      | 29       | 21       |
| j3         | 8 (6-10)         | 11-12          | 9 (8-11)        | 16       | 25       |
| j4         | 6 (5-8)          | 9-10           | 9 (8-11)        | 11       | 12       |
| j5         | 7 (6-8)          | 9              | 9 (8-11)        | 11       | 12       |
| j6         | 8 (6-8)          | 10-11          | 9 (8-11)        | 16       | 12       |
| j2         | 9 (8-10)         | 12-13          | 11 (11-13)      | 13       | 13       |
| j5         | 7 (5-8)          | 7-9            | 6               | 8        | 7        |
| z2         | 9 (8-10)         | 11-12          | 9 (8-11)        | 14       | 14       |
| z4         | 9 (8-10)         | 11-12          | 9 (8-11)        | 13       | 20       |
| z5         | 7 (5-8)          | 9-10           | 9 (8-11)        | 11       | 12       |
| Z1         | 9 (9-10)         | 10-12          | 9 (8-11)        | 11       | 12       |
| Z4         | 10               | 11-14          | 11 (11-13)      | 16       | 15       |
| Z5         | 50 (55-65)       | 59-65          | 55 (55-60)      | 53       | 50       |
| s4         | 14 (13-14)       | 16-20          | 16 (16-19)      | 21       | 30       |
| S2         | 9 (8-10)         | 12-14          | 11 (11-13)      | 14       | 16       |
| S4         | 10 (9-10)        | 12-16          | 11 (11-13)      | 14       | 16       |
| S5         | 9 (8-10)         | 11-13          | 11 (11-13)      | 14       | 14       |
| r3         | 14 (13-15)       | not reported   | 13 (13-16)      | 19       | 14       |
| R1         | 9 (8-10)         | not reported   | 9               | 11       | 14       |
| S1-St1     | 57 (55-58)       | not reported   | not reported    | nr       | nr       |
| S1-St3     | 58 (55-60)       | 77-86          | 88 (82-91)      | 58       | 58       |
| S2-St2     | 67 (65-68)       | not reported   | not reported    | 70       | 70       |
| S3-St3     | 74 (70-78)       | 71-78          | 95 (91-101)     | nr       | nr       |
| S4-St4     | 79 (78-80)       | not reported   | not reported    | nr       | nr       |
| S5-St5     | 72 (68-75)       | not reported   | 88 (82-91)      | 74       | 80       |
| Lisl       | 26 (25-28)       | not reported   | not reported    | nr       | nr       |
| Lsiv       | 2                | not reported   | not reported    | nr       | nr       |
| Sisl       | 10 (8-13)        | not reported   | not reported    | nr       | nr       |
| Vs1        | 91 (78-100)      | 95-108         | 88 (82-91)      | ?        | 100      |
| vsw vZ2    | 49 (45-50)       | 69             | 69 (69-76)      | 48       | ?        |
| Vsw anus   | 71 (70-73)       | not reported   | not reported    | 67       | 70       |
| JV5        | 39 (38-40)       | not reported   | 38 (38-47)      | nr       | 37       |
| Sge1       | 22 (20-25)       | not reported   | 28              | nr       | nr       |
| SgeII      | 27 (25-28)       | not reported   | 32 (32-35)      | 29       | 25       |
| SgeIII     | 35               | not reported   | 38 (41-44)      | 38       | 30       |
| StiIII     | 27 (25-28)       | not reported   | 32 (32-35)      | 29       | nr       |
| SgeIV      | 57 (55-58)       | 64-72          | 72 (63-72)      | 56       | 58       |
| StiIV      | 38               | 40-47          | 41 (44-47)      | 38       | 51       |
| StIV       | 67 (65-68)       | 71-80          | 76 (76-79)      | 70       | 95       |
| sel        | 15               | 16-18          | not reported    | 19       | 24       |
| scw        | 5                | not reported   | not reported    | nr       | 5        |
| Fdl teeth  | invisible        | not reported   | 6               | nr       | nr       |
| Mdl teeth  | invisible        | not reported   | nr              | nr       | nr       |

Data from this study for Grande Comore, from Meyer and Rodrigues (1966) for Mozambique holotype + paratype females, from Ueckermann and Louts (1988) for South Africa (measurements for holotype and between brackets for 6 paratype females), from Moraes et al. (2001b) for Congo and from El-Banhawy and Knapp (2011) for Kenya. nr = not reported.
**Genus Iphiseius Berlese**

*Iphiseius* Berlese, 1916: 33; Chant & McMurtry, 2005b: 217; 2007: 123.

**Iphiseius degenerans** (Berlese)

*Seius degenerans* (Berlese, 1889): 9; *Amblyseius (Iphiseius) degenerans*, Muma, 1961: 288; *Typhlodromus degenerans*, Hirschmann, 1962: 2; *Iphiseius (Iphiseius) degenerans*, Pritchard & Baker 1962: 299; *Amblyseius degenerans*, Zaher, 1986: 99; Northcraft, 1987: 521; Papadoulis & Emmanouel, 1991: 36; *Iphiseius degenerans*, Berlese, 1921: 95; Evans, 1954: 518; Moraes et al., 1986: 61; 2004: 92; Chant & McMurtry, 2005b: 215; 2007: 125; *Iphiseius martigellus* El-Badry, 1968: 325 (synonymy according to Chant & McMurtry, 2005; El-Banhawy & Knapp, 2011).

The biological characteristics of this Ethiopian species have been well documented because of its use in controlling thrips on various cultivated plants in greenhouses. *Iphiseius degenerans* is a commercially available biological control agent of thrips and spider mites in greenhouse crops. It is able to feed on a variety of foods, but thrips’ larvae and sweet pepper pollen are unfavourable food for immature development. This could compromise the establishment of this biological control agent when used against thrips in sweet pepper crops. According to the classification by McMurtry et al. (2013), *I. degenerans* is a type-III generalist predator. It is one of the most common native phytoseiid mite species on cassava in southern Africa (Zannou et al. 2005) and feeds on *Mononychellus tanajoa* (Bondar) (Nwilene and Nachman 1996), a widely distributed neotropical mite pest of cassava in Africa, insect larvae and pollen of many plants (Vantornhout et al. 2005).

Another study concluded that *I. degenerans* can be considered a suitable biological control candidate based on its preference for *Eutetranychus orientalis nec* (Klein) in the Mediterranean region (Fantinou et al. 2012).

*Iphiseius degenerans* preys on *Oligonychus perseae* Tuttle, Baker & Abbatiello outside the webbed nests. Although *I. degenerans* contribution to *O. perseae* biocontrol can be assessed, it needs to be taken into account the importance of alternative food source (e.g. Castor oil pollen) for predator population growth (Zappala et al. 2015).

Specimens examined — Mdé, INRAPE (long. 11°41’S, lat. 43°14’E, alt. 50 m), 7 ♀♀ + 4 ♂♂ on *Ricinus communis* L. (Euphorbiaceae), 2-02-2017.

Previous record — Numerous countries in Northern and Southern Africa (Demite et al. 2017), in Mediterranean area (Cyprus, Greece, Italy, Portugal), in Near East or Middle East (Egypt, Israel, Lebanon, Saudi Arabia, Syria, Turkey, Yemen), in Europe (Georgia), in South America (Brazil) and in North America (USA in California, Florida, Georgia, New Hampshire).

Remarks (Tables 3 and 4) — Measurements of the 7 ♀♀ + 4 ♂♂ fit well with measurements of specimens reported in the literature for closest countries, except width of the ventral and the anal shields of the female and JV’5 which is more than 40% longer.
Table 3  Comparisons of character measurements of female specimens of *Iphiseius degenerans* collected in different locations (Localities followed by the number of specimens measured between brackets)

| Characters | Grande Comore (7) | Kenya (66) | Various countries (12) |
|------------|-------------------|------------|------------------------|
| Dsl        | 420 (370-462)     | 360        | 373 (363-387)          |
| Dsw        | 362 (350-375)     | 345        | 309 (290-317)          |
| J1         | 24 (20-25)        | 23         | 24 (14-32)             |
| J3         | 5                 | Not reported | 5 (4-8)            |
| J4         | 5                 | Not reported | 4 (3-6)            |
| J5         | 5                 | Not reported | 4 (3-5)            |
| J6         | 5                 | Not reported | 5 (4-6)            |
| J7         | 5                 | Not reported | 6 (4-7)            |
| J5         | 5                 | Not reported | 6 (5-7)            |
| Z2         | 5                 | Not reported | 5 (4-8)            |
| Z4         | 5                 | Not reported | 5 (4-9)            |
| Z5         | 5                 | Not reported | 4 (3-5)            |
| Z1         | 5                 | Not reported | 6 (5-8)            |
| Z4         | 8 (6-9)           | Not reported | 7 (5-9)            |
| Z5         | 14 (11-15)        | 12         | 14 (11-20)            |
| Z1         | 5                 | Not reported | 8 (7-12)            |
| Z2         | 8                 | Not reported | 8 (6-9)            |
| Z4         | 8                 | Not reported | 9 (6-11)            |
| Z5         | 9 (8-9)           | Not reported | 9 (7-11)            |
| Z1         | 9 (8-9)           | Not reported | 9 (10-13)           |
| V5         | 11 (9-13)         | Not reported | 9 (7-10)            |
| St1-St1    | 57 (55-60)        | Not reported | Not reported          |
| St1-St3    | 54 (53-55)        | 46         | 49 (42-52)            |
| St2-St2    | 71 (68-75)        | 64         | 71 (67-73)            |
| St3-St3    | 86 (65-93)        | Not reported | Not reported          |
| St4-St4    | 96 (90-100)       | Not reported | Not reported          |
| St5-St5    | 96 (90-103)       | 100        | 96 (91-103)           |
| Lisl       | 36 (30-38)        | Not reported | Not reported          |
| Lsiw       | 5 (4-8)           | Not reported | Not reported          |
| Sis1       | 14 (13-18)        | Not reported | Not reported          |
| Vsl        | 35 (33-38)        | Not reported | Not reported          |
| StV        | 77 (70-83)        | 74         | 65 (58-73)            |
| Asl        | 72 (68-75)        | Not reported | Not reported          |
| Vsw anus   | 77 (70-83)        | Not reported | 72 (68-77)            |
| JS5        | 24 (20-25)        | 14         | Not reported          |
| Sgel1      | 24 (21-25)        | 23         | Not reported          |
| Sgel2      | 30 (28-33)        | 35         | Not reported          |
| Stel1      | 25 (25-26)        | Not reported | Not reported          |
| SgelIV     | 43 (40-50)        | 30         | Not reported          |
| StelIV     | 29 (25-33)        | 25         | Not reported          |
| StelV      | 32 (30-33)        | 38         | Not reported          |
| Sel        | Not reported      | Not reported | Not reported          |
| Sew        | Not reported      | Not reported | Not reported          |
| Fdl        | 27 (25-30)        | 26 (24-27) | Not reported          |
| teeth      | 7                 | Not reported | 6-8                 |
| Mdl        | 25 (23-27)        | 31 (27-35) | 1-2                 |

Data from this study for Grande Comore, from El-Banhawy and Knapp (2011) for Kenya, from Moraes et al. (2007) for various countries (Burundi 1, Cameroon 1, Ghana 1, Kenya 2, Malawi 2, Rwanda 1, Sierra Leone 2, Uganda 1, Zambia 1) in Africa. nr = not reported.
Table 4 Comparisons of character measurements of male specimens of *Iphiseius degenerans* collected in different locations (Localities followed by the number of specimens measured between brackets)

| Characters | Grande Comore (4) | Kenya (?) | Various countries (5) |
|------------|-------------------|-----------|----------------------|
| Dsl        | 306 (295-312)     | Not reported | 318 (283-356)       |
| Dsw        | 232 (238-250)     | Not reported | 255 (244-261)       |
| j1         | 21 (18-23)        | Not reported | 20 (11-25)          |
| j3         | 5                 | Not reported | 5 (4-5)             |
| j4         | 5                 | Not reported | 3 (3-5)             |
| j5         | 5                 | Not reported | 4 (4-5)             |
| j6         | 5                 | Not reported | 4 (3-4)             |
| J5         | 5                 | Not reported | 5 (4-6)             |
| z2         | 5                 | Not reported | 4 (3-5)             |
| z4         | 5                 | Not reported | 4 (3-5)             |
| z5         | 5                 | Not reported | 3 (3-4)             |
| Z1         | 5                 | Not reported | 5                   |
| Z4         | 8                 | Not reported | 5 (4-5)             |
| Z5         | 14 (13-15)        | Not reported | 13 (9-16)           |
| s4         | 5                 | Not reported | 7 (6-9)             |
| S2         | 7                 | Not reported | 6 (5-7)             |
| S4         | 7                 | Not reported | 6 (5-8)             |
| S5         | 7                 | Not reported | 7 (5-10)            |
| r3         | 12 (10-13)        | Not reported | 11 (10-12)          |
| R1         | 6 (5-9)           | Not reported | 7 (6-9)             |
| St1-St1    | 49 (48-50)        | Not reported | Not reported        |
| St1-St5    | 114 (110-118)     | Not reported | Not reported        |
| St2-St2    | 62 (60-63)        | Not reported | Not reported        |
| St3-St3    | 64 (60-68)        | Not reported | Not reported        |
| St4-St4    | 60 (58-63)        | Not reported | Not reported        |
| St5-St5    | 52 (48-58)        | Not reported | Not reported        |
| Vs1        | 71 (68-73)        | Not reported | Not reported        |
| Vs vZV2    | 171 (165-175)     | 210         | 176 (172-179)       |
| As1        | 51 (48-55)        | Not reported | Not reported        |
| Asw        | 64 (58-68)        | 75          | 66 (63-75)          |
| JV3        | 22 (20-23)        | Not reported | Not reported        |
| SgelII     | 21 (18-25)        | Not reported | 21 (18-24)          |
| SgelII     | 29 (28-30)        | Not reported | 27 (21-32)          |
| StII       | 24 (23-25)        | Not reported | 21 (20-24)          |
| SgelIV     | 42 (40-43)        | Not reported | 36 (30-40)          |
| StIV       | 30 (28-30)        | Not reported | 28 (27-30)          |
| Shaft length | 31 (30-33)    | Not reported | 28 (26-32)          |
| Fdl        | 24 (23-25)        | Not reported | 22 (22-45)          |
| teeth      | 23 (20-25)        | Not reported | Not reported        |
| teeth      | 4                 | Not reported | Not reported        |
| Mdl        | 22 (20-23)        | Not reported | Not reported        |

Data from this study for Grande Comore, from El-Banhawy and Knapp (2011) for Kenya, from Moraes *et al.* (2007) for various countries (Ghana 1, Kenya 1, Rwanda 1, Sierra Leone1, Uganda 1) in Africa. nr = not reported.
Tribe Neoseiulini Chant and McMurtry
Neoseiulini Chant & McMurtry, 2003a: 6.

Genus Neoseiulus Hughes
Neoseiulus Hughes, 1948: 141.

Neoseiulus longispinosus (Evans)
Typhlodromus longispinosus Evans, 1952: 413; Evans, 1953: 465; Womersley, 1954: 177; Ehara, 1958: 55;
Typhlodromus (Amblyseius) longispinosus, Chant, 1959: 74;
Amblyseius longispinosus, Corpuz and Rimando, 1966: 129; Schicha, 1975: 103;
Neoseiulus longispinosus, Moraes et al., 1986: 85; 2000: 245; 2004: 129; Chant & McMurtry 2003a: 37; 2007: 29.

This species is distributed in many countries of the world, mainly in tropical areas, especially in Guadeloupe and other Islands of the French Antilles (Moraes et al. 2000; Mailloux et al. 2010; Kreiter et al. 2013; Kreiter et al. in press).

Neoseiulus longispinosus, a type II phytophagid predatory mite (McMurtry et al. 2013), has received increasing attention in Asia for the control of spider mites since 2010 (Nusartlert et al. 2011). It can develop on different tetranychid species of the genera Eutetranychus, Oligonychus, and Tetranychus (Nusartlert et al. 2011). Several studies demonstrated the potential of the predatory mite to control spider mite outbreaks including Oligonychus coffeae (Nietner) on tea (Rahman et al. 2013), Stigmaeopsis nanjingensis (Ma & Yuan) on bamboo in China (Zhang et al. 1999) or Eotetranychus cendanai Rimando in greenhouse crops (Thongtab et al. 2001). In addition, N. longispinosus was also found to have a great potential for practical applications due to its resistance or tolerance to agricultural chemicals (Zhang et al. 1996).

Thus, the biology of this species has been studied mostly for pest control purposes including side effects of miticides (Bin Ibrahim and Tan 2000). The activity, feeding, development, predation, cannibalism, intra-guild predation and behaviour have been extensively studied by several authors (Croft et al. 1999a, b; Schausberger and Croft 1999a, b; 2000a, b; Blackwood et al. 2001). It was found very rarely in Mascareignes area except in a study on companion plants in citrus orchards in La Réunion (Le Bellec, unpublished data). This species seems to be more common on grasses of the lower vegetation, especially Fabaceae with populations of tetranychid mites. However, the recent results of Huyen et al. (2017) show that at least in controlled laboratory conditions the predatory mite N. longispinosus is a potential biological control agent against the citrus red spider mite P. citri.

Previous Records — Australia, China (Fujian, Guangdong, Guangxi, Hainan, Yunnan), Cuba, Dominican Republic, Guadeloupe, Egypt, Hawaii, Hong-Kong, India, Indonesia, Japan, Les Saintes, Malaysia, Marie-Galante, Martinique, New Zealand, Nicaragua, Pakistan, Papua New Guinea, Philippines, Russia, South Korea, Sri Lanka, Taiwan, Thailand, USA (Florida), Vietnam.

Specimens examined — Moroni, Adoudja (long. 11°41′S, lat. 43°15′E, alt. 100 m), 1 ♀ on Plectranthus scutellarioides (L.) R. Br. (Lamiaceae), 2-02-2017.

Remarks (Table 5) — Measurements of the single female collected show that most of the setae lengths are 7 to 15 % longer, except J6, J2, J5, and Z4. All ventral, spermathecal and cheliceral dimensions agree well except ventrianal shield length and width at the level of anus and JV5 which are longer.
Table 5 Comparisons of character measurements of female specimens of *Neoseiulus longispinosus* collected in different locations (Localities followed by the number of specimens measured between brackets)

| Characters | Grande Comore (8) | Martinique (8) | F.C.I. (7) | Sri Lanka (3) | Holotype |
|------------|------------------|----------------|-----------|---------------|----------|
| Dsl        | 380              | 321 (295-340)  | 332 (308-398) | 321 (313–338) | 332      |
| Dsw        | 192              | 168 (150-183)  | 179 (154-200) | 187 (175–208) | 173      |
| j1         | 20               | 16 (13-18)     | 18 (16-22)   | 18 (17–19)    | 14       |
| j3         | 69               | 58 (48-63)     | 59 (52-64)   | 58 (56-60)    | 49       |
| j4         | 70               | 56 (50-65)     | 59 (52-65)   | 58 (56-60)    | 49       |
| j5         | 78               | 66 (60-73)     | 69 (64-75)   | 70 (69-71)    | 59       |
| j6         | 78               | 68 (60-83)     | 72 (68-75)   | 70 (68-72)    | 64       |
| J2         | 88               | 76 (68-88)     | 76 (73-78)   | 77 (75-79)    | 66       |
| J5         | 10               | 9 (8-10)       | 9 (8-11)     | 8             | 10       |
| z2         | 75               | 64 (58-70)     | 65 (62-68)   | 69 (68-70)    | 58       |
| z4         | 78               | 70 (63-87)     | 69 (67-73)   | 73 (73–75)    | 58       |
| z5         | 38               | 31 (28-35)     | 35 (32-40)   | 32 (32–38)    | nr       |
| Z1         | 83               | 74 (68-80)     | 75 (72-80)   | 77 (76-78)    | 67       |
| Z4         | 78               | 69 (63-78)     | 71 (67-75)   | 72 (71-73)    | 68       |
| Z5         | 85               | 77 (65-80)     | 80 (78-81)   | 80 (80-81)    | 72       |
| S4         | 88               | 69 (63-76)     | 72 (68-76)   | 73 (70-79)    | 67       |
| S4         | 63               | 52 (45-58)     | 57 (48-76)   | 59 (57–62)    | 49       |
| z5         | 18               | 14 (13-15)     | 16 (14-16)   | 21 (19–23)    | 15       |
| r3         | 75               | 54 (45-63)     | 57 (49-62)   | 55 (55–56)    | 54       |
| R1         | 70               | 57 (50-63)     | 61 (57-65)   | 60 (59-62)    | 58       |
| St1-St1    | 48               | 46 (45-50)     | Not reported | Not reported  | nr       |
| St1-St3    | 55               | 54 (53-55)     | 55 (49-57)   | 55 (53-56)    | nr       |
| St2-St2    | 60               | 58 (55-60)     | 60 (59-62)   | 53 (50-55)    | nr       |
| St3-St3    | 73               | 70 (68-73)     | Not reported | Not reported  | nr       |
| St4-St4    | 85               | 72 (63-88)     | Not reported | Not reported  | nr       |
| St5-St5    | 58               | 53 (50-63)     | 56 (52-60)   | 53 (51–54)    | nr       |
| Lisl       | 23               | 28 (23-33)     | Not reported | Not reported  | nr       |
| Lsiw       | 3                | 3              | Not reported | Not reported  | nr       |
| Sisl       | 18               | 13 (10-15)     | Not reported | Not reported  | nr       |
| Vsl        | 125              | 111 (103-120)  | 115 (94-121) | 106 (103–111) | 97       |
| vsVZ2      | 90               | 84 (75-90)     | 86 (80-92)   | 91 (89-93)    | 87       |
| vsV anus   | 78               | 70 (65-75)     | 75 (67-83)   | 75 (73–77)    | nr       |
| JV5        | 73               | 60 (55-63)     | Not reported | Not reported  | nr       |
| StIV       | 75               | 81 (75-88)     | 80 (75-87)   | 68 (68–70)    | 80-87    |
| Scl        | 25               | 20 (17-25)     | 28 (25-30)   | 21 (20–21)    | 30       |
| Scw        | 5                | 5              | Not reported | Not reported  | 4        |
| Fdl        | 23               | 24 (23-25)     | 25 (22-27)   | 22 (21–22)    | 4        |
| teeth      | ?                | 4              | 4-5         | 5             | nr       |
| Mdl        | 23               | 24 (23-25)     | 24 (22-25)   | 25 (23-25)    | 2        |

Data from this study for Grande Comore, from Kreiter et al. (2018) for Martinique, from Moraes et al. (2000) for F.C.I (French Caribbean Islands, from various localities of five Islands), from Moraes et al. (2004) for Sri Lanka, and from Evans (1952) for the holotype from Indonesia, re-described by Schicha (1975). nr = not reported.
Subfamily Phytoseiinae Berlese
Phytoseini Berlese, 1913: 3; Phytoseiinae, Vitzthum, 1941: 768.

Genus Phytoseius Ribaga
Phytoseius Ribaga, 1904: 177.

Phytoseius amba Pritchard & Baker
Phytoseius (Pennaseius) amba Pritchard & Baker 1962: 224; Blommers, 1976: 85; Phytoseius (Phytoseius) amba, Denmark, 1966: 49; Typhlodromus (Pizytoseius) amba, Van der Merwe, 1968: 101; Phytoseius amba, Swirski & Ragusa, 1978: 408; Pennaseius amba, Matthysse & Denmark, 1981: 352; Phytoseius amba, Moraes et al., 1986: 210; 2004: 232; Chant & McMurtry, 2007: 129.

Species of the genus Phytoseius are supposed to belong to the Type III species (McMurtry and Croft 1997; McMurtry et al. 2013), i.e. a polyphagous generalist predator. However, the biology of Phytoseius amba remains totally unknown.

Specimens examined — Mde, INRAPE (long. 11°41′S, lat. 43°14′E, alt. 50 m), 1 ♀ on Annona muricata L. (Annonaceae), 2-02-2017.

Previous Records — Benin, Burundi, Cameroon, Cape Verde, DR Congo, Kenya, Madagascar Island, Malawi, Mozambique, Nigeria, Reunion Island, Rwanda, Senegal, South Africa, Zambia, Zimbabwe.

Remarks (Table 6) — The setae lengths seem very variable in this species following data of the literature. Measurements of the single adult female (Table 6) agree well with measurements of the literature, especially with those of Ueckermann et al. (2007) obtained with a great number of specimens (29) from various countries in Africa, with the exception of longer j3 and z3, shorter st5-st5, ventrianal shield length and width at the level of anus and macrosetae of the basitarsus and telotarsus.

Conclusion
Only one species was known before 2017 from the Comoros Archipelago (Schicha 1984). After this preliminary survey conducted in only two locations, the number of species known from Comoros Islands is now of six; four Amblyseiinae: Amblyseius herbicolus, Euseius baetae, Iphiseius degenerans, Neoseiulus longispinosus; and two Phytoseiinae: Phytoseius amba and Phytoseius mayottae. No Typhlodrominae were found until now. This is still a low number of species and from a tropical island, one could have expected a higher number, even from only two locations. The low number of species could be explained by the fact that samplings were made in crops more or less disturbed and not in wild areas.

Some of the species collected during this survey have interesting potential for biological control, especially A. herbicolus, I. degenerans and N. longispinosus. This must be underlined as new regulations on importation of macro-organisms are proposed in a lot of countries and specifically for over-sea territories for countries like France that have very far tropical territories. Therefore it is impossible to import and of course to sell and use exotic species if they are not indigenous in the territory. An importation permit must be requested, but it is expensive and chances to obtain are generally very low (Kreiter et al. 2016). The knowledge of the biodiversity, especially of efficient biological control agents from oversea territories,
Table 6  Comparisons of character measurements of female specimens of *Phytoseius amb* collected in different locations (Localities followed by the number of specimens measured between brackets)

| Characters | Grande Comore (1) | South Africa (11) | Various Countries (29) | Madagascar (6) | Kenya (8) | Holotype |
|------------|------------------|-------------------|------------------------|---------------|----------|----------|
| Dsl        | 270              | 264-284           | 282 (264-304)          | Not reported  | 288 (271-312) | 283      |
| Dsw        | 155              | 130-145           | 141 (133-149)          | Not reported  | 144 (139-149) | 165      |
| j1         | 23               | 24-26             | 22 (19-27)             | 19-25         | 24 (22-26) | 24       |
| j3         | 63               | 46-50             | 49 (40-56)             | 50-56         | 50 (41-60) | 42       |
| j4         | 5                | 7                 | 4 (3-5)                | nr            | 4 (2-5)   | 3        |
| j5         | 5                | 7                 | 4 (3-5)                | nr            | 4 (2-5)   | 3        |
| j6         | 6                | 7                 | 5 (3-6)                | nr            | 5 (2-7)   | 4        |
| J2         | 9                | 9-11              | 6 (5-8)                | nr            | 5         | 6        |
| J5         | 8                | 11-14             | 10 (8-13)              | nr            | 11 (10-12) | 11       |
| z2         | 13               | 9-11              | 7 (5-10)               | nr            | 7 (5-10)  | 5        |
| z3         | 43               | 26-29             | 23 (16-27)             | 19-31         | 24 (19-29) | 17       |
| z4         | 10               | 9-11              | 8 (5-11)               | nr            | 8 (5-12)  | 5        |
| z5         | 5                | 7                 | 4 (3-5)                | nr            | 5 (2-5)   | 5        |
| Z4         | 63               | 60-80             | 62 (48-70)             | 59-65         | 62 (55-67) | 64       |
| Z5         | 70               | 57-80             | 76 (59-86)             | 64-77         | 75 (67-82) | 83       |
| s4         | 89               | 70-85             | 81 (53-102)            | 78-82         | 76 (70-86) | 81       |
| s6         | 75               | 60-80             | 77 (48-96)             | 71-78         | 78 (67-86) | 79       |
| r1         | 39               | 37-45             | 40 (34-46)             | 37-44         | 39 (34-43) | 41       |
| R1         | 15               | 12-16             | 13 (10-16)             | Not reported  | 14 (12-17) | 12       |
| S1-Sr1     | 68               | 50-60             | Not reported           | Not reported  | Not reported | nr   |
| S1-Sr3     | 58               | 68-75             | 60 (56-64)             | Not reported  | 59 (53-60) | 60       |
| S2-Sr2     | 63               | Not reported      | 69 (64-72)             | Not reported  | 70 (67-72) | 79       |
| S3-Sr3     | 68               | Not reported      | Not reported           | Not reported  | Not reported | Nr |
| S4-Sr4     | 73               | Not reported      | Not reported           | Not reported  | Not reported | Nr |
| S5-Sr5     | 55               | 67-72             | 67 (62-74)             | Not reported  | 69 (67-72) | 63       |
| Lisl       | 18               | Not reported      | Not reported           | Not reported  | Not reported | nr |
| Lsiw       | 2                | Not reported      | Not reported           | Not reported  | Not reported | nr |
| Sisl       | 8                | Not reported      | Not reported           | Not reported  | Not reported | nr |
| Vsl        | 83               | 90-98             | 99 (86-106)            | Not reported  | 99 (84-108) | 100      |
| vsw ZV2    | 48               | 48-55             | 55 (50-64)             | Not reported  | 60 (55-67) | 53       |
| vsw anus   | 38               | Not reported      | 49 (43-56)             | Not reported  | 49 (48-53) | 46       |
| JV5        | 45               | 45-51             | Not reported           | 54            | Not reported | nr |
| SgelIV     | 25               | 24-28             | 25 (19-32)             | 23-27         | 26 (24-34) | 21       |
| SglIV      | 25               | 30-35             | 34 (26-40)             | 30-36         | 33 (29-38) | 31       |
| SblIV      | 23               | 33-38             | 35 (27-43)             | 30-34         | 33 (26-43) | 39       |
| SnlIV      | 23               | 26-30             | 32 (28-38)             | 28-32         | Not reported | 36 |
| Scl        | 18               | 16-18             | 13 (8-19)              | Not reported  | 20 (17-24) | 12       |
| Scew       | 10               | 4-7               | Not reported           | Not reported  | Not reported | nr |
| fdl        | 23               | 24                | 25 (23-26)             | Not reported  | 20 (17-24) | 17       |
| mdl        | 23               | 24                | 25 (23-26)             | Not reported  | 24         | 17       |

Data from this paper for Grande Comore, from Van der Merwe (1968) for South Africa, from Ueckermann et al. (2007) for various countries (Burundi 8, Cameroon 1, Ghana 2, Kenya 5, Rwanda 7, Sierra Leone 1, South Africa 4, Democratic Republic of Congo 1) in Africa, from Blommers (1976) for Madagascar, from Moraes et al. (1989) for Kenya and measurements of the holotype. nr = not reported.
not only for conversation purposes but also for agricultural and economical ones, is so of a considerable importance.

Acknowledgements

Thanks are due to Mr. Hadji MOUIGNI (from INRAPE) who has helped Jacques Fillâtre (Armeflhor) to collect mites in Grande Comore Island and the two anonymous reviewers for improvement of the paper.

References

Akyazi R., Ueckermann E.A., Soysal M. 2016. The new distribution of Amblyseius herbicolus in Turkey (Parasitiformes, Phytoseiidae) with a key of Amblyseius species found in Turkey. Acarologia, 56(2): 237-244. doi:10.1051/acarologia/20162241

Athias-Henriot C. 1975. Nouvelles notes sur les Amblyseini. II. Le relevé organotaxique de la face dorsale adulte (Gamasides, Phytoseiidae). Acarologia, 27: 20-29.

Bhattacharyya S.K. 1968. Two new phytoseiid mites from eastern India (Acarina: Phytoseiidae). J. Bombay Nat. Hist. Soc., 65(3): 677-680.

Berlese A. 1899. Acari, Myriopoda et Scorpiones hucusque in Italia reperta. Tipografia Del Seminario, 6(54): 7-9.

Berlese A. 1913. Systema Acarorum generis in familia suis disposita. Acaroteca Italiana, 1-2: 3-19.

Berlese A. 1914. Acarinuovi. Manipulus IX. Redia, 10: 113-150.

Berlese A. 1916. CenturiaprimadiAcarinuovi. Redia, 12: 19-66.

Bin Ibrahim Y., Tan S.Y. 2000. Influence of sublethal exposure to abamectin on the biological performance of Neoseiulus longispinosus (Acarai: Phytoseiidae). J. Econ. Entomol., 93(4): 1085-1089. doi:10.1603/0022-0493.93.4.1085

Blackwood J.S., Schausberger P., Croft B.A. 2001. Prey stage preferences in generalist and specialist phytoseiid mites (Acarai: Phytoseiidae) when offered Tetranychus urticae (Acarai: Tetranychidae) eggs and larvae. Environ. Entomol., 30: 1103-1111. doi:10.1603/0046-225X-30.6.1103

Blommers L. 1976. Some Phytoseiidae (Acarina: Mesostigmata) from Madagascar, with description of eight new species and notes on their biology. Bijdragen tot Dierkunde, 46(1): 80-106.

Chant D.A. 1959. Phytoseiid mites. Part I. Bionomics of seven species in southeastern England. Part II. A taxonomic review of the family Phytoseiidae, with descriptions of 38 new species. Can. Entomol., 91, suppl. 12: 1-166.

Chant D.A., McMurtry J.A. 1994. A review of the subfamilies Phytoseiinae and Typhlodrominae. Intern. J. Acarol., 20: 223-310. doi:10.1080/01647959408684022

Chant D.A., McMurtry J.A. 2003. A review of the subfamily Amblyseiinae Muma (Acarai: Phytoseiidae): Part I. Neoseiulini new tribe. Intern. J. Acarol., 29(1): 3-46. doi:10.1647/50308684319

Chant D.A., McMurtry J.A. 2004. A review of the subfamily Amblyseiinae Muma (Acarai: Phytoseiidae): Part II. The tibe Amblyseiini Wainstein, subtribe Amblyseiini n. subtribe. Intern. J. Acarol., 30(3): 171-228. doi:10.1647/050308684368

Chant D.A., McMurtry J.A. 2005. A review of the subfamily Amblyseiinae Muma (Acarai: Phytoseiidae): Part IV. The tibe Euseiini n. tribe, subtribe Typhlodromalina n. subtribe, Euseiini n. subtribe, and Ricolaeiini n. subtribe. Intern. J. Acarol., 31(3): 187-224. doi:10.1647/050308684424

Chant D.A., McMurtry J.A. 2007. Illustrated keys and diagnoses for the genera and sub-genera of the Phytoseiidae of the World. Indira Publishing House, West Bloomfield, Michigan, USA, 220 pp.

Chant D.A., Yoshida Shaul E. 1991. Adult ventral setal patterns in the family Phytoseiidae, with descriptions of 38 new species. Can. Entomol., 123(3): 187-199. doi:10.1603/01647959108683906

Chaudhri W.M. 1968. Six new species of mites of the genus Amblyseius (Phytoseiidae) from Pakistan. Acarologia, 10: 550-562.

Corpus L.A., Rimando L. 1966. Some Philippine Amblyseiinae (Phytoseiidae: Acarina). Philippine Agriculture, 50: 114-136.

Croft B.A., Lu h.-K., Schausberger P. 1999a. Larval size relative to larval feeding, cannibalism of larvae, egg, or adult female size and larval-adult setal patterns among thirteen phytoseiid mite species. Exp. Appl. Acarol., 23: 599-610. doi:10.1023/A:1006236310613

Croft B.A., McMurtry J.A., Lu h.-K. 1999b. Do literature citation frequencies for six prey-food groups reflect feeding specialization and preferences among for Phytoseiid predation types?. Exp. Appl. Acarol., 23: 551-565. doi:10.1023/A:1006235110613

Daneshvar H., Denmark H.A. 1982. Phytoseiids of Iran (Acarina: Phytoseiidae). Intern. J. Acarol., 8(1): 3-14. doi:10.1647/050308683272

De Leon D. 1967. Some mites of the Caribbean Area. Part I. Acarina on Plants in Trinidad, West Indies. Allen Press Inc., Lawrence, Kansas, 66 pp.

Demite P.R., Moraes G.J. de, McMurtry J.A., Denmark H.A., Castilho R.C. 2017. Phytoseiidae Database. Available from: www.lea.esalq.usp.br/phytoseiidae

Kreiter S. et al. (2018), Acarologia 58(3): 529-545; DOI 10.24349/acarologia/20184256
Denmark H.A. 1966. Revision of the genus Phytoseius Ribaga, 1904 (Acarina: Phytoseiidae). Fla Dep. Agric. Bull., 6: 1-105.

Denmark H.A., Muma M.H. 1989. A revision of the genus Amblyseius Berlese, 1914 (Acarina: Phytoseiidae). Occasional Papers of the Florida State Collection of Arthropods, USA, 4, 149 pp.

Duarte M.V.A, Venzon M., Bittencourt M.C.de S., Rodriguez-Cruz F.A., Pallini A., Janssen A. 2015. Alternative food promotes broad mite control on chilli pepper plants. BioControl, 60: 817-825.

Ehara S. 1958. Three predatory mites of the genus Typhlodromus from Japan (Phytoseiidae). Annot. Zool. Japonenses, 31: 53-57.

El-Badry E.A. 1968. Three new species of phytoseiid mites from western Sudan. Rev. Zool. Bot. Afric., 77: 321-328.

El-Banhawy E.M., Knapp M. 2011 Mites of the family Phytoseiidae Berlese from Kenya (Acari: Mesostigmata). Zootaxa, 2945: 1-176.

Evans G.O. 1952. On a new predatory mite of economic importance. Bull. Entomol. Res., 43: 397-401.

Evans G.O. 1953. On some mites of the genus Amblyseius Scheuten, 1857, from S. E. Asia. Ann. Mag. Nat. Hist., 6: 449-467.

Evans G.O. 1954. The genus Iphiseius Berlese (Acarina: Laelaptidae). Proceed. Zool. Soc., 124: 517-526.

Fantiou A., Baxevari A., Drizou F., Labropoulos P., Perdikis D., Papadoulis G. 2012. Consumption rate, functional response and preference of the predaceous mite Iphiseius degenerans to Tetranychus urticae and Eutetranychus orientalis. Exp. Appl. Acarol., 58:133-144.

Gupta S.K. 1981. On a collection of Phytoseiidae (Acari: Mesostigmata) from Himachal Pradesh (India), with descriptions of two new species. Ind. J. Acarol., 5: 32-36.

Gupta S.K. 1986. Fauna of India (Acarina: Mesostigmata) Family Phytoseiidae. Zoological Survey of India, Calcutta, India, 350 pp.

Hirschmann W. 1962. Gangsystematik der Parasitiformes. Acarologische Schriftenreihe fur 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.

Huyen L.T., Tung N.D., Lan D.H., Chi C.V., De Clercq P., Dinh N.V. 2017. Life table parameters and development of Neoseiulus longispinosus (Acarina: Phytoseiidae) reared on citrus red mite, Panonychus citri (Acarina: Tetranychidae) at different temperatures. Syst. Appl. Acarol., 22(9): 1316-1326.

Kade N., Gueye-Ndiaye A., Duverney C., Moraes G.J. de. 2011. Phytoseiid mites (Acarina: Phytoseiidae) from Senegal. Acarologia, 51(1): 133-138. doi:10.11158/saa.2011/001

Karg W. 1991. Die Raubmilbenarten der Phytoseiidae Berlese (Acarina) Mitteleuropas sowie angrenzender Gebiete. Zoologische Jahrbucher Systematik, 118(1): 1-64.

Kreiter S., Vicente V., Tixier M.-S., Fontaine O. 2016. An unexpected occurrence of Amblyseius swirskii Athias-Henriot in La Réunion Island (Acarina: Phytoseiidae). Acarologia, 56(2): 175-181.

Kreiter S., Mailloux J., Tixier M.-S., Le Belléc F., Douin M., Guichou S., Etienne J. 2013. New phytoseiid mites of the French Antilles, with description of a new species and new records (Acari: Mesostigmata). Acarologia, 53(3): 285-303.

Kreiter S., Zriki G., Ryckewaert P., Pancarte C., Douin M., Tixier M.-S. 2018. Phytoseiid mites of Martinique, with redescription of four species and new records (Acari: Mesostigmata). Acarologia, 58(2): 366-407. doi:10.24349/acarologia/20184248

Lindquist E., Evans G.W. 1965. Taxonomic concepts in the Ascidiae, with a modified setal nomenclature for the idiosoma of the Gamasina Acarina: Mesostigmata. Mem. Entomol. Soc. Can., 47: 1-64. doi:10.4039/entm9747fv

Mailloux J., Le Belléc F., Kreiter S., Tixier M.-S., Dubois P. 2010. Influence of ground cover management on diversity and density of phytoseiid mites (Acarina: Phytoseiidae) in Guadeloupean citrus orchards. Exp. Appl. Acarol., 52: 275-290. doi:10.1007/s10493-010-9367-7

Matthysse J.G., Denmark H.A. 1981. Some phytoseiids of Nigeria (Acarina: Mesostigmata). The Fa Entomol., 64: 340-357. doi:10.2307/349458

Meyer M.K.P., Rodrigues M.C. 1966. Acari associated with cotton in southern Africa (with reference to other plants). Garcia de Orta, Revista Junta Investigacoes de Ultramar, 13(2): 195-226.

McMurtry J.A., Croft B.A. 1997. Life-styles of phytoseiid mites and their roles in biological control. Ann. Rev. Entomol., 42: 291-321. doi:10.1146/annurev.ento.42.1.291

McMurtry J.A., Moraes G.J. de, Sourassou N.F. 2013. Revision of the life styles of phytoseiid mites (Acari: Phytoseiidae) and implications for biological control strategies. Syst. Appl. Acarol., 18: 297-320.

McMurtry J.A., McMurtry J.A., Danmark H.A. 1986. A catalog of the mite family Phytoseiidae. References to taxonomy, synonymy, distribution and habitat. EMBRAPA – DDT, Brazil, Brazil, 353 pp.

Moraes G.J. de, McMurtry J.A., Denmark H.A., Campos C.B. 2004b. A revised catalog of the mite family Phytoseiidae. Zootaxa, 434: 1-494. doi:10.11646/zootaxa.434.1.1
Moraes G.J. de, Pritchard A.E., Baker E.W. 1962. Mites of the family Phytoseiidae (Acari: Phytoseiidae) from tropical Africa. Zootaxa, 8: 1-10. doi:10.11646/zootaxa.8.1.1

Moraes G.J. de, Oliveira A.R., Zannou I.D. 2001a. New phytoseiid mites (Acari: Phytoseiidae) from tropical Africa. Zootaxa, 8: 1-10. doi:10.11646/zootaxa.8.1.1

Moraes G.J. de, Ueckermann E.A., Oliveira A.R., Yaninek J.S. 2001b. Phytoseiidae mites of the genus *Euseius* (Acari: Phytoseiidae) from Sub-Saharan Africa. Zootaxa, 3: 1-70.

Moraes G.J. de, Zannou I.D., Ueckermann E.A., Oliveira A.R., Yaninek J.S., Hanna R. 2007. Phytoseiid mites of the tribes Afroseiulini, Kampimodromini and Phytoseiulini, and complementary notes on mites of the tribes Euseiini and Neoseiulini (Acari: Phytoseiidae) from sub-Saharan Africa. Zootaxa, 1628: 1-22.

Muma M.H. 1961. Mitoses associated with citrus in Florida. Fla Agric. Exp. Stat. Bull., 640: 1-39.

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.

Myers N. 1988. Threatened biotas: hotspots in tropical forests. Environmentalist, 8: 187-208. doi:10.1007/BF02300252

Myers N., Mittermeier R.A., Mittermeier C.G., Da Fonseca G.A., Kent J. 2000. Biodiversity hotspots for conservation priorities. Nature, 403: 853-858. doi:10.1038/35002501

Northcroft P.D. 1987. First record of three indigenous predacious mites in Zimbabwe. J. Entomol. Soc. S. Afric., 50(2): 521-522.

Nusarliert N., Vichitbandha P., Baker G., Chandrapatya A. 2011. Pesticide-induced mortality and prey-dependent life history of the predatory mite *Neoseiulus longispinosus* (Acari: Phytoseiidae). Trends in Acarology. Netherlands, Springer: 495-498.

Nwilene F.E., Nachman G. 1996. Functional responses of *Iphiseius degenerans* and *Neoseiulus teke* (Acari: Phytoseiidae) to changes in the density of the cassava green mite, *Mononychellus tanajoa* (Acari: Tetranychidae). Exp. Appl. Acarol., 20: 259-271. doi:10.1007/BF00052876

Papadoulis G.Th., Emmanuel N.G. 1991. The genus *Amblyseius* (Acari: Phytoseiidae) in Greece, with the description of a new species. Entomologia Hellenica, 9: 35-62. doi:10.12681/eh.1990

Pritchard A.E., Baker E.W. 1962. Mites of the family Phytoseiidae from Central Africa, with remarks on genera of the world. Hilgardia, 33: 205-309. doi:10.3733/hilg.v33i07p20p

Rahman V.J., Babu A., Roobakkumar A., Perumalsamy K. 2013. Life table and predation of *Neoseiulus longispinosus* (Acari: Phytoseiidae) on *Oligonychus coffeae* (Acari: Tetranychidae) infesting tea. Exp. Appl. Acarol., 60: 229-240. doi:10.1007/s10493-012-9649-1

Reis P.R., Teodoro A.V., Pedro Neto M., Da Silva E.A. 2007. Life history of *Amblyseius herbicola* (Chant) (Acari: Phytoseiidae) on coffee plants. Neotrop. Entomol., 36(2): 282-287. doi:10.1590/S1519-560X2007000200016

Ribaga C. 1904 (1902). Gamasidiplanticoli. Riv. Patol. Veg., 10: 175-178.

Rodriguez-Cruz F.A., Venzon M., Pinto C.M.F. 2013. Performance of *Hypoderma maltii* (Diptera: Oestridae) on *Amblyseius herbicolus* (Acari: Phytoseiidae) on *Oligonychus coffeae* (Acari: Tetranychidae). Exp. Appl. Acarol., 60: 497-507. doi:10.1007/s10493-013-9685-y

Rowell H.J., Chant D.A., Hansell R.I.C. 1978. The determination of setal homologies and setal patterns in the description of a new species. Entomologia Hellenica, 9: 35-62. doi:10.12681/eh.1990

Schicha E. 1975. Contribution to the knowledge of the genus *Phytoseius* Ribaga in Australia, the South Pacific and Indian Ocean regions with four new species and records of known species (Acari: Phytoseiidae). Intern. J. Acarol., 10(2): 117-128. doi:10.1080/01647958408683361

Schicha E. 1984. Contribution to the knowledge of the genus *Phytoseius* Ribaga in Australia, the South Pacific and Indian Ocean regions with four new species and records of known species (Acari: Phytoseiidae). Intern. J. Acarol., 10(2): 117-128. doi:10.1080/01647958408683361

Swirski E., Ragusa S. 1978. Three new species of phytoseiid mites from Kenya (Mesostigmata: Phytoseiidae). Zool. J. Linnean Soc., 63: 397-409. doi:10.1111/j.1096-3642.1978.tb0101.x

Thongrattana T., Chandrapatya A., Baker G. 2001. Biology and efficacy of the predatory mite, *Amblyseius longispinosus* (Evan’t)(Acari, Phytoseiidae) as a biological control agent of *Eotetranychus cenderani* Rimando (Acari, Tetranychidae). J. Appl. Entomol., 125: 543-549. doi:10.1046/j.1439-0418.2001.00583.x

Ueckermann E.A., Loots G.C. 1988. The African species of the subgenera *Anthoseius* De Leon and *Amblyseius* Berlese (Acari: Phytoseiidae). Entomol. Mem. Depart. Agric. Water Supply, RSA, 73: 1-168

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. Entomol. Mem., South Africa Department of Agricultural Technical Services, 18: 1-198.

Kreiter S. et al. (2018), *Acarologia* 58(3): 529-545; DOI 10.24349/acarologia/20184256
Vantomhout I., Minnaert H.L., Tirry L., Clercq P. 2005. Influence of diet on life table parameters of *Iphiseius degenerans* (Acari: Phytoseiidae). Exp. and Appl. Acarol., 35: 183-195. doi:10.1007/s10493-004-3940-x

Vitzthum H. von 1941. *Acari.* In: Bronns, H.G. (Ed.), *Klassen und Ordnungen des Tierreichs 5*, Akademischer Verlag, Leipzig, Germany, 764-767.

Wainstein B.A. 1962. Révision du genre *Typhlodromus* Scheuten, 1857 et systèmeatische de la famille des Phytoseiidae (Berlese 1916) (Acarina: Parasitiformes). Acarologia, 4: 5-30.

Womersley H. 1954. Species of the subfamily Phytoseinae (Acarina: Laelaptidae) from Australia. Austral. J. Zool., 2: 169-191. doi:10.1071/ZO9540169

Zaher M. A. 1986. Survey and ecological studies on phytophagous, predacious and soil mites in Egypt. 11 A: Predacious and non phytophagous mites (Nile Valley and Delta). Fac. Agric., Cairo Univ., 567 pp.

Zannou I.D., Hanna R., Moraes G.J. de, Kreiter S., Phiri G., Jone A. 2005. Mites of cassava (*Manihot esculenta* Crantz) habitats in Southern Africa. Intern. J. Acarol., 31(2): 149-164. doi:10.1080/0164795050883667

Zannou I.D., Moraes G.J. de, Ueckermann E.A., Oliveira A.R., Yaninek J.S., Hanna R. 2007. Phytoseiid mites of the subtribe Amblyseina (Acarí: Phytoseiidae: Amblyseiini) from sub-Saharan Africa. Zootaxa, 1550: 1-47.

Zappalà L., Kreiter S., Russo A., Tropea Garzia G., Auger P. 2015. First record of the Persea Mite *Oligonychus perseae* (Acarí: Tetranychidae) in Italy with a review of the literature. Intern. J. Acarol., 41(2): 1-3. doi:10.1080/01647954.2015.1014415

Zhang Y., Lin J., Wen Z., Mao D., Chi Y. 1996. Effect of temperature on life history and predatory functional response of *Amblyseius longispinosus* (Acarí: Phytoseiidae). Fujian J. Agric. Sci., 11: 41-44.

Zhang Y., Zhang Z.-Q., Ji J., Lin J. 1999. Predation of *Amblyseius longispinosus* (Acarí: Phytoseiidae) on *Schizotetranychus nanjingensis* (Acarí: Tetranychidae), a spider mite injurious to bamboo in Fujian, China. Syst. Appl. Acarol., 4: 63-68. doi:10.11158/saa.4.1.9