Phytoseiid mites from tropical fruit trees in Bahia State, Brazil (Acari, Phytoseiidae)

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Abstract

The cultivation of tropical fruit trees has grown considerably in the state of Bahia, northeastern Brazil. Some of these have been severely attacked by phytophagous mites, which are usually controlled by the use of chemical pesticides. However, there is today a growing interest for the adoption of less aggressive measures of pest control, as for example the use of predatory mites. Most of the plant-inhabiting predatory mites belong to the family Phytoseiidae. The objective of this paper is to report the phytoseiid species found in an intensive survey conducted on cultivated tropical fruit trees in fifteen localities of the southern coast of Bahia. Measurements of relevant morphological characters are provided for each species, to complement the understanding of the morphological variation of these species. Twenty-nine species of sixteen genera were identified. A key was elaborated to assist in the separation of these species. Fifteen species are reported for the first time in the state, raising to sixty-six the number of species of this family now known from Bahia. Seventy-two percent of the species collected belong to Amblyseiinae, followed by Typhlodrominae (21%) and Phytoseiinae (7%). The most diverse genus was Amblyseius, Amblyseius operculatus De Leon was the most frequent and abundant species. Studies should be conducted to evaluate the possible role of the most common predators as control agents of the phytophagous mites co-occurring with them.
Keywords
Acarology, Predatory mites, Taxonomy, Biological Control

Introduction

Cultivation of tropical fruit trees has grown considerably in the state of Bahia, northeastern Brazil, in the last years (Santos-Serejo et al. 2009). Several mite species have been reported on those plants, some causing economic losses (Moraes and Flechtmann 2008). These are usually controlled by the use of chemical pesticides.

However, there is today a growing interest on the use of less aggressive and less toxic strategies to control those organisms. Predatory mites of the family Phytoseiidae are considered important biological control agents of pest mites, and some phytoseiids are commercially available for the control of pest mites in several countries (Hoy 2011). There is an interest to implement the use of phytoseiids for the biological control of pest mites in orchards of tropical fruit trees in coastal Bahia, and the determination of the naturally occurring phytoseiids in that area is considered the first step in the implementation of a biological control program.

The objective of this paper is to report the phytoseiid species found in an intensive survey conducted on cultivated tropical fruit trees in the southern coastal region of Bahia, providing a key to help the separation of the species collected.

Materials and methods

Samples were collected from March 2007 to January 2010 in fifteen localities of eight municipalities (Figure 1, Table 1). These consisted mainly of leaves and, when present, flowers and fruits of 21 species of tropical fruit trees (Table 2).

Phytoseiid mites were mounted in Hoyer’s medium, identified and measured under a phase-contrast microscope (Motie® B3 Professional Series). Under each species mentioned in the Results section, information concerning the specimens examined is given in the following order: sampling locality, plant species, month and year of the collection, number and sex of specimens. Measurements are given in micrometers, corresponding to the average for the structures measured followed in parentheses by the respective ranges. 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 absent.

Idiosomal setal notation adopted is that of Lindquist and Evans (1965), as applied to phytoseiids 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. Macrosetal notation is that of Muma et al. (1970). The system of classification follows that of Chant and McMurtry (2007). The name adopted for each species is that mentioned in the Phytoseiidae Database (Demite et al. 2014), followed by the names attributed
Figure 1. Map locating the municipalities in the State of Bahia, Brazil, where collections were conducted.

to the species in the original description, in the catalog of Moraes et al. (2004) and in the comprehensive work of Chant and McMurtry (2007).

Voucher specimens were deposited in the mite reference collection of Universidade Estadual de Santa Cruz (UESC), Ilhéus, Bahia.
Table 1. Localities in the State of Bahia, Brazil, from which phytoseiid mites were collected between March 2007 and January 2010.

| Municipality | Sampling locality     | Coordinates        |
|--------------|------------------------|-------------------|
| Camamu       | Fazenda Bela Vista     | 13°58'35"S, 39°09'23"W |
| Ilhéus       | UESC                  | 14°47'53"S, 39°10'20"W |
|              | Fazenda Terra Nova    | 14°43'52"S, 39°09'16"W |
|              | Sítio Agrotropical    | 14°47'00"S, 39°14'42"W |
| Itabuna      | Fazenda Monte Alegre  | 14°43'29"S, 39°20'42"W |
|              | Fazenda Frupical      | 13°46'29"S, 39°11'04"W |
|              | Fazenda Kamui         | 13°45'11"S, 39°10'50"W |
| Ituberá      | Colônia de Japoneses  | 14°45'23"S, 39°10'58"W |
|              | Fazenda Kamui         | 13°45'11"S, 39°10'50"W |
| Taperóia     | Fazenda Nossa Senhora Auxiliadora | 13°33'52"S, 39°12'06"W |
| Una          | Estação Lemos Maia-CEPLAC | 15°21'18"S, 38°59'56"W |
| Uruçuca      | Fazenda Liberdade     | 14°35'52"S, 39°19'55"W |
| Valença      | Fazenda Barra         | 13°21'05"S, 39°19'57"W |
|              | Fazenda Formiga       | 13°18'01"S, 39°15'02"W |
|              | Sítio Sabino          | 13°18'59"S, 39°15'46"W |
|              | Sítio São Jorge       | 13°17'23"S, 39°18'05"W |

Table 2. Species of tropical fruit trees from which phytoseiid mites were collected in the State of Bahia, Brazil, between March 2007 and January 2010.

| Family           | Plant species                                                                 |
|------------------|------------------------------------------------------------------------------|
| Anacardiaceae    | Anacardium occidentale L.                                                     |
|                  | Mangifera indica L.                                                          |
|                  | Spondias mombin L.                                                           |
| Annonaceae       | Annona muricata L.                                                           |
|                  | Annona squamosa L.                                                           |
| Areccaceae       | Cocos nucifera L.                                                            |
|                  | Elaeis guineensis Jacq.                                                      |
|                  | Euterpe oleracea Mart.                                                       |
| Caricaceae       | Carica papaya L.                                                             |
| Ebenaceae        | Diospyros kaki L.                                                            |
| Lauraceae        | Persea americana L.                                                          |
| Malpighiaceae    | Malpighia emarginata D.C.                                                    |
| Moraceae         | Artocarpus integrifolia Lam.                                                 |
| Musaceae         | Musa sapientum L.                                                            |
| Myrtaceae        | Psidium guajava L.                                                           |
|                  | Syzygium malaccense (L.) Merr. & L.M. Perry                                  |
| Passifloraceae   | Passiflora edulis Sims.                                                      |
| Rubiaceae        | Genipa americana L.                                                          |
| Sapotaceae       | Pouteria caimito (Ruiz & Pav.) Radlk.                                         |
| Sterculiaceae    | Theobroma cacao L.                                                           |
|                  | Theobroma grandiflorum Schum.                                                |
Results

In total, 564 phytoseiid specimens were collected, belonging to twenty-nine species of sixteen genera, as subsequently reported. Most specimens were collected from *C. nucifera* (41%), followed by *T. cacao* (24%), and *P. guajava* (16%) (Tables 3 and 4).

Amblyseinae Muma

*Amblydromalus manihoti* (Moraes)

*Amblyseius manihoti* Moraes et al., 1994: 211.
*Typhlodromalus manihoti*: Moraes et al. 2004: 200.
*Amblydromalus manihoti*: Chant and McMurtry 2007: 117.

**Specimens examined.** UESC, *C. papaya*, I-2008 (2♀); Fazenda Bela Vista, *T. cacao*, XI-2007 (2♀); Fazenda Frupical, *T. grandiflorum*, VII-2007 (1♀); Fazenda Liberdade, *C. papaya*, V-2007 (2♀).

**Table 3.** Numbers of specimens and of species of phytoseiid mites collected on each sampled plant species in the State of Bahia, Brazil, between March 2007 and January 2010.

| Family        | Plant species          | Nr.* | Specimens | Species |
|---------------|------------------------|------|-----------|---------|
| Anacardiaceae | *Anacardium occidentale* | 1    | 3         | 3       |
|               | *Mangifera indica*     | 2    | 15        | 6       |
|               | *Spondias mombin*      | 3    | 1         | 1       |
| Annonaceae    | *Annona muricata*      | 4    | 12        | 4       |
|               | *Annona squamosa*      | 5    | 2         | 1       |
| Arecaeeae     | *Cocos nucifera*       | 6    | 234       | 17      |
|               | *Elaeis guineensis*    | 7    | 7         | 5       |
|               | *Euterpe oleracea*     | 8    | 6         | 6       |
| Caricaceae    | *Carica papaya*        | 9    | 9         | 4       |
| Ebenaceae     | *Diospyros kaki*       | 10   | 3         | 3       |
| Lauraceae     | *Persea americana*     | 11   | 2         | 1       |
| Malpighiaceae | *Malpighia emarginata* | 12   | 1         | 1       |
| Moraceae      | *Artocarpus integrifolia* | 13  | 6         | 3       |
| Musaceae      | *Musa sapientum*       | 14   | 9         | 8       |
| Myrtaceae     | *Psidium guajava*      | 15   | 92        | 13      |
|               | *Syzygium malaccense*  | 16   | 1         | 1       |
| Passifloraceae| *Passiflora edulis*    | 17   | 5         | 2       |
| Rubiaceae     | *Genipa americana*     | 18   | 3         | 1       |
| Sapotaceae    | *Pouteria caimito*     | 19   | 2         | 1       |
| Sterculiaceae | *Theobroma cacao*      | 20   | 137       | 15      |
|               | *Theobroma grandiflorum* | 21  | 14        | 6       |

*Corresponding to plant species numbers given in Table 4.*
Table 4. Numbers of phytoseiid mites and diversity of host plants on which each species was collected in the State of Bahia, Brazil, between March 2007 and January 2010.

| Phytoseiid species          | Nr. of specimens | Plant species nr.* |
|-----------------------------|------------------|--------------------|
| **Amblyseiinae**            |                  |                    |
| Amblyseius operculatus      | 133              | 1, 2, 4, 6, 7, 10, 11, 12, 13, 14, 15, 20, 21 |
| Amblyseius perditius        | 57               | 2, 6, 7, 13, 14, 15, 20, 21 |
| Iphiseiodes metapodalis     | 53               | 2, 4, 5, 6, 7, 8, 14, 15, 20, 21 |
| Iphiseiodes zuluagai        | 47               | 1, 2, 4, 6, 7, 8, 9, 19, 20, 21 |
| Amblyseius aerialis         | 32               | 6, 9, 15, 20, 21 |
| Amblyseius tamatavensis     | 32               | 6, 8, 14, 17 |
| Amblyseius igarassuensis    | 28               | 6, 15, 20 |
| Typhlodromips theobromae   | 15               | 2, 20 |
| Amblyseius impeltatus       | 10               | 15 |
| Iphiseiodes setillus        | 8                | 8, 20 |
| Paraamblyseius multicrocularis | 8              | 8, 20 |
| Amblydromalus manihoti      | 7                | 9, 20, 21 |
| Typhlodromalus peregrinus   | 7                | 6, 9, 15, 20 |
| Proprioseiopsis neotropicus | 6                | 6, 10, 14, 20 |
| Proprioseiopsis dominigos   | 4                | 6, 14, 15 |
| Arrenoseius urquharti       | 3                | 6, 14 |
| Proprioseiopsis ovatus      | 3                | 8, 14, 17 |
| Paraphytoseius orientalis   | 2                | 15 |
| Phytocutus sexpilis         | 1                | 15 |
| Proprioseiopsis pentagonalis| 1                | 20 |
| Typhlodromips mangleae      | 1                | 6 |
| **Phytoseiinae**            |                  |                    |
| Phytoseius latinus          | 21               | 15 |
| Phytoseius woodburyi        | 12               | 6, 15 |
| **Typhlodrominae**          |                  |                    |
| Leonseius regularis         | 56               | 2, 3, 4, 6, 7, 13, 15, 16, 18, 20 |
| Cocoseius palmarum          | 9                | 6 |
| Cocoseius elsalvador        | 5                | 6, 20 |
| Metaseiulus ferlai          | 1                | 1 |
| Typhlodromina subtropica    | 1                | 10 |
| Typhlodromus transvaalensis | 1                | 6 |

*Corresponding to plant species numbers given in Table 3.

**Female.** Four specimens measured. Dorsal shield 328 (320–338) long, 214 (205–223) wide, \( j_1 \) 29 (28–31), \( j_3 \) 38 (35–41), \( j_4 \) 10 (8–11), \( j_5 \) 9 (8–10), \( j_6 \) 12 (11–12), \( J_2 \) 14 (12–15), \( J_5 \) 9 (7–10), \( z_2 \) 11 (10–13), \( z_4 \) 12 (11–14), \( z_5 \) 9 (8–10), \( Z_1 \) 14 (13–15), \( Z_4 \) 14 (13–17), \( Z_5 \) 50 (47–51), \( s_4 \) 39 (35–44), \( S_2 \) 16 (15–17), \( S_4 \) 15 (14–16), \( S_5 \) 13 (11–14), \( r_3 \) 13 (12–13), \( R_1 \) 13 (11–14); distances between \( St_1–St_3 \) 58 (55–60), \( St_2–St_2 \) 67 (64–73) and \( St_5–St_5 \) 69 (66–71); ventrianal shield 96 (92–105) long, 59 (56–
62) wide at level of ZV2 and 67 (64–70) wide at level of anus; movable cheliceral digit 32 (31–32) long, with 4 teeth; fixed cheliceral digit 26 (25–26) long, with 11 teeth; calyx of spermatheca 20 (16–23) long; Sge I 36 (34–38), Sge II 34 (32–37), Sge III 38 (36–41), Sti III 34 (32–36), Sge IV 61 (56–66), Sti IV 46 (40–51), St IV 80 (75–82).

**Remarks.** Measurements of the specimens collected are similar to those of the original description. They also agree with those of Moraes et al. (2013), except for the shorter Z5 [64 (52–70) in the latter].

**Amblyseius aerialis** (Muma)

*Amblyseiopsis aerialis* Muma, 1955: 264.

*Amblyseius aerialis*: Moraes et al. 2004: 13.

*Amblyseius aerialis*: Chant and McMurtry 2007: 75.

**Specimens examined.** UESC, *T. grandiflorum*, IV-2008 (1 ♀); Fazenda Bela Vista, *C. nucifera*, IV-2007 (12 ♀), *P. guajava*, VII-2007 (1 ♀), *T. cacao*, XI-2007 (1 ♀); Fazenda Friginal, *T. grandiflorum*, VII-2007 (2 ♀); Fazenda Liberdae, *C. papaya*, V-2007 (1 ♀); Fazenda Nossa Senhora Auxiliadora, *C. papaya*, VII-2007 (1 ♀), *C. nucifera*, XI-2007 (2 ♀); Fazenda Terra Nova, *C. nucifera*, V-2007 (5 ♀); Sitio Agrotropical, *C. nucifera*, III-2007 (1 ♀); Sitio São Jorge, *C. nucifera*, XI-2007 (1 ♀, 4 ♂).

**Female.** Ten specimens measured. Dorsal shield 386 (364–422) long, 284 (266–309) wide, j1 34 (30–37), j3 55 (52–59), j4 5 (4–8), j5 5 (4–6), j6 7 (6–8), J2 9 (7–11), J5 8 (7–8), z2 14 (13–16), z4 9 (8–13), z5 6 (5–7), Z1 10 (12–10), Z4 133 (120–143), Z5 296 (271–315), s4 108 (105–111), S2 12 (11–14), S4 11 (11–14), S5 13 (12–13), r3 16 (14–17), RI 12 (11–13); distances between St1–St3 65 (63–71), St2–St2 83 (79–88) and St5–St5 81 (74–87); ventrianal shield 131 (120–142) long, 85 (78–91) wide at level of ZV2 and 73 (69–77) wide at level of anus; movable cheliceral digit 42 (39–44) long, with 4 teeth; fixed cheliceral digit 34 (33–35) long; calyx of spermatheca 18 (16–20) long; Sge I 44 (42–48), Sge II 42 (39–45), Sge III 61 (55–67), Sti III 40 (37–43), Sge IV 131 (118–138), Sti IV 90 (83–94), St IV 80 (75–84).

**Male.** Five specimens measured. Dorsal shield 309 (294–320) long, 217 (189–248) wide, j1 31 (28–32), j3 44 (43–45), j4 5 (5–6), j5 5 (4–6), j6 8 (6–9), J2 9 (8 10), J5 8 (7–8), z2 14 (13–15), z4 13 (12–13), z5 6 (5–7), Z1 10 (9–11), Z4 103 (102–105), Z5 229 (215–241), s4 85 (80–90), S2 12 (11–14), S4 9 (7–11), S5 10 (6–12), r3 17 (14–20), RI 12 (11–13); ventrianal shield 131 (122–137) long and 160 (156–162) wide at anterior corners; shaft of spermatodactyl 19 (16–20) long; Sge I 37 (32–39), Sge II 35 (30–39), Sge III 40 (37–41), Sti III 34 (32–35), Sge IV 82 (75–90), Sti IV 63 (56–70), St IV 61 (55–66).

**Remarks.** The calyx of spermatheca of the specimens collected is about 1.5 times longer than reported by Denmark and Muma (1989) (11–12), but it is comparable to measurements of Brazilian specimens given by Gondim Jr. and Moraes (2001).
Amblyseius igarassuensis Gondim Jr. & Moraes

Amblyseius igarassuensis Gondim Jr. & Moraes, 2001: 71.
Amblyseius igarassuensis: Moraes et al. 2004: 30.
Amblyseius igarassuensis: Chant and McMurtry 2007: 78.

Specimens examined. UESC, P. guajava, I-2008 (3♂); Fazenda Bela Vista, C. nucifera, IX-2007 (2♀, 3♂); Fazenda Monte Alegre, T. cacao, V-2007 (3♀), I-2008 (3♀, 1♂), fruit, IX-2007 (1♀); Fazenda Terra Nova, T. cacao, IX-2007 (1♀), I-2008 (6♀, 5♂).

Female. Eight specimens measured. Dorsal shield 331 (307–346) long, 216 (197–241) wide, j1 25 (23–26), j3 37 (35–39), j4 8 (6–9), j5 7 (6–8), j6 10 (10–11), J2 10 (9–11), J5 9 (8–10), z2 11 (9–12), z4 11 (11–12), z5 7 (6–7), ZI 10 (9–11), Z4 64 (60–66), Z5 141 (130–155), z4 59 (56–61), S2 11 (10–13), S4 10 (10–11), S5 10 (9–11), r3 12 (11–14), RI 10 (9–11); distances between St1–St3 62 (60–63), St2–St2 66 (60–68) and St5–St5 62 (59–64); ventrianal shield 110 (102–118) long, 75 (68–79) wide at level of ZV2 and 65 (62–70) wide at level of anus; movable cheliceral digit 34 (32–35) long, with 3 teeth; fixed cheliceral digit 29 (25–30) long; calyx of spermatheca 10 (9–13) long; Sge I 35 (34–38), Sge II 34 (33–37), Sge III 33 (30–35), Sti III 28 (26–29), Sge IV 57 (55–60), Sti IV 44 (41–46), St IV 57 (51–61).

Male. Seven specimens measured. Dorsal shield 252 (243–261) long and 158 (141–174) wide, j1 23 (17–28), j3 32 (31–34), j4 8 (7–9), j5 8 (7–8), j6 9 (9 10), J2 9 (8–10), J5 7 (6–8), z2 10 (9–12), z4 10 (8–11), z5 8 (7–8), ZI 10 (9–11), Z4 48 (41–52), Z5 109 (90–138), z4 41 (38–44), S2 11 (9–12), S4 10 (8–11), S5 8 (7–10), r3 12 (11–13), RI 10 (8–11); ventrianal shield 103 (98–110) long and 133 (122–150) wide at anterior corners; shaft of spermatodactyl 18 (17–20) long; Sge I 30 (29–34), Sge II 28 (26–31), Sge III 27 (23–32), Sti III 23 (21–27), Sge IV 39 (35–47), Sti IV 32 (27–38), St IV 47 (39–60).

Remarks. Measurements of females of this species are similar to those of the original description, except for the longer Z5 (91–118 in the original description). This is the first record of this species in Bahia, and the first report of the measurements of males.

Amblyseius impeltatus Denmark & Muma

Amblyseius impeltatus Denmark & Muma, 1973: 241.
Amblyseius impeltatus: Moraes et al. 2004: 30.
Amblyseius impeltatus: Chant and McMurtry 2007: 78.

Specimens examined. UESC, P. guajava, VII-2007 (10♀).

Female. Six specimens measured. Dorsal shield 367 (335–410) long, 228 (207–256) wide, j1 18 (16–19), j3 25 (22–28), j4 8 (8–9), j5 7 (4–8), j6 8 (7–11), J2 10 (8–13), J5 7 (5–8), z2 13 (12–15), z4 11 (10–12), z5 8 (7–9), ZI 12 (10–13), Z4 31
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125 (113–133), S4 42 (41–44), S2 13 (12–14), S4 12 (10–14), S5 10 (9–11), r3 12 (11–12), R1 12 (11–12); distances between St1–St3 53 (51–54), St2–St2 68 (66–69) and St5–St5 78 (77–82); ventrianal shield 90 (85–100) long, 80 (74–86) wide at level of ZV2 and 68 (65–72) wide at level of anus; movable cheliceral digit 30 long, with 3 teeth; fixed cheliceral digit 27 (26–29) long; calyx of spermatheca 6 (5–6) long; Sge I 30 (29–30), Sge II 32 (31–33), Sge III 38 (36–40), Sti III 26 (25–27), Sge IV 63 (61–65), Sti IV 47 (45–48), St IV 49 (47–52).

Remarks. Measurements of the specimens collected fit those of the original description. This is the first record of this species in Bahia.

**Amblyseius operculatus** De Leon

*Amblyseius operculatus* De Leon, 1967: 26.

*Amblyseius operculatus*: Moraes et al. 2004: 45.

*Amblyseius operculatus*: Chant and McMurtry 2007: 80.

**Specimens examined.** UESC, *M. sapientum* VII-2007 (1 ♀), *C. nucifera*, VII-2007 (4 ♀), I-2008 (3 ♂), IV-2008 (1 ♂), *A. muricata*, VII-2007 (1 ♀, 1 ♂), *E. guineensis*, VII-2007 (1 ♀), *P. guajava*, VII-2007 (3 ♀, 2 ♂), *A. integrifolia*, VII-2007 (1 ♀), *T. grandiflorum*, VIII-2007 (1 ♀), *P. americana*, I-2008 (2 ♀); CEPLAC, *C. nucifera*, IV-2008 (1 ♀), fruits, VI-2008 (1 ♀), IV-2009 (1 ♀), V-2009 (1 ♀), VII-2009 (2 ♀, 4 ♂), VIII-2009 (7 ♀), IX-2009 (2 ♀, 1 ♂), X-2009 (5 ♀, 1 ♂), XI-2009 (5 ♀, 1 ♂), XII-2009 (10 ♀, 4 ♂), I-2010 (3 ♀, 1 ♂); Colônia de Japoneses, *C. nucifera*, XI-2007 (2 ♀, 4 ♂); Fazenda Barra, *A. occidentale*, VIII-2007 (1 ♀), *T. cacao*, XI-2007 (2 ♀); Fazenda Bela Vista, *C. nucifera*, IV-2007 (1 ♀), IX-2007 (2 ♀); Fazenda Formiga, *C. nucifera*, VIII-2007 (5 ♀), fruit, VIII-2007 (1 ♀); Fazenda Frupical, *M. sapientum*, VII-2007 (1 ♀), *T. cacao*, VII-2007 (3 ♀), fruit, VII-2007 (1 ♀); Fazenda Liberdade, *T. cacao*, V-2007 (1 ♀); Fazenda Monte Alegre, *P. guajava*, V-2007 (1 ♀), IX-2007 (1 ♀), V-2008 (1 ♀), *M. indica*, IX-2007 (1 ♀), *T. cacao*, VII-2007 (1 ♀), fruit, VII-2007 (1 ♀); Fazenda Terra Nova, *T. cacao*, V-2007 (2 ♀), *D. kaki*, V-2007 (1 ♀), *C. nucifera*, IX-2007 (6 ♀, 1 ♂); Sítio São Jorge, *C. nucifera*, XI-2007 (5 ♀), XI-2007 (1 ♀).

**Female.** Thirteen specimens measured. Dorsal shield 389 (340–428) long, 259 (205–289) wide, j1 37 (33–42), j3 48 (42–55), j4 7 (5–8), j5 6 (5–7), j6 8 (6–10), j2 8 (7–11), J5 8 (7–9), z2 14 (12–16), z4 12 (10–13), z5 7 (6–9), Z1 10 (8–13), Z4 131 (115–148), Z5 283 (223–307), s4 109 (91–120), S2 13 (11–15), S4 11 (11–12), S5 12 (11–13), r3 17 (15–22), R1 12 (10–13); distances between St1–St3 69 (64–71), St2–St2 77 (72–80) and St5–St5 72 (67–77); ventrianal shield 125 (117–135) long, 77 (70–82) wide at level of ZV2 and 78 (66–85) wide at level of anus; movable cheli-
ceral digit 45 (42–48) long, with 4 teeth; fixed cheliceral digit 33 (30–36) long; calyx of spermatheca 10 (8–12) long; \( S_{g 1} \) 48 (45–51), \( S_{g 2} \) 44 (42–47), \( S_{g 3} \) 57 (50–63), \( S_{t 1} \) 41 (37–44), \( S_{g 4} \) 121 (105–136), \( S_{t 2} \) 81 (65–91), \( S_{t 4} \) 82 (75–89).

**Male.** Eight specimens measured. Dorsal shield 294 (269–323) long, 217 (197–251) wide, \( j_{1} \) 29 (27–31), \( j_{3} \) 44 (42–47), \( j_{4} \) 6 (5–7), \( j_{5} \) 5 (5–6), \( j_{6} \) 8 (7–9), \( j_{2} \) 9 (7–10), \( j_{5} \) 7 (6–9), \( z_{2} \) 13 (10–15), \( z_{4} \) 11 (10–13), \( z_{5} \) 7 (6–7), \( Z_{1} \) 10 (8–11), \( Z_{4} \) 101 (90–115), \( Z_{2} \) 218 (208–236), \( s_{2} \) 82 (77–88), \( S_{2} \) 12 (11–13), \( S_{4} \) 11 (10–13), \( S_{5} \) 12 (10–13), \( r_{3} \) 15 (14–17), \( R_{1} \) 11 (10–12); ventrianal shield 129 (115–140) long and 165 (147–181) wide at anterior corners; shaft of spermatodactyl 23 (21–25) long; \( S_{g 1} \) 38 (35–40), \( S_{g 2} \) 35 (31–37), \( S_{g 3} \) 39 (35–43), \( S_{t 1} \) 31 (27–33), \( S_{g 4} \) 81 (72–94), \( S_{t 2} \) 60 (55–70), \( S_{t 4} \) 65 (61–70).

**Remarks.** Measurements of the specimens collected are similar to those of the original description, as well as to those of Gondim Jr. and Moraes (2001).

**Amblyseius perditus** Chant & Baker

**Amblyseius perditus** Chant & Baker, 1965: 16.

**Amblyseius perditus:** Moraes et al. 2004: 47.

**Amblyseius perditus:** Chant and McMurtry 2007: 80.

**Specimens examined.** UESC, *C. nucifera*, VII-2007 (1♀), IV-2008 (1♀), *E. guineensis*, VII-2007 (1♀), *P. guajava*, VII-2007 (1♀), I-2008 (3♀), *T. grandiflorum*, VII-2007 (1♀), *A. integrifolia*, I-2008 (2♀); Fazenda Barra, *T. cacao*, XI-2007 (1♀); Fazenda Frupical, *M. sapientum*, VII-2007 (1♀), *T. cacao*, IV-2007 (1♀), VII-2007 (1♀), IX-2007 (2♀); Fazenda Liberdade, *C. nucifera*, V-2007 (5♀), *M. indica*, V-2007 (1♀), *T. cacao*, V-2007 (3♀); Fazenda Monte Alegre, *P. guajava*, V-2007 (2♀), IX-2007 (2♀, 1♂), I-2008 (5♀); Fazenda Nossa Senhora Auxiliadora, *T. cacao*, VII-2007 (14♀); Fazenda Terra Nova, *C. nucifera*, V-2007 (1♀), IX-2007 (2♀), *P. guajava*, I-2008 (5♀).

**Female.** Fifteen specimens measured. Dorsal shield 345 (333–358) long, 217 (197–238) wide, \( j_{1} \) 34 (29–36), \( j_{3} \) 38 (35–43), \( j_{4} \) 7 (6–8), \( j_{5} \) 6 (5–7), \( j_{6} \) 9 (8–10), \( j_{2} \) 9 (8–11), \( j_{5} \) 8 (7–9), \( z_{2} \) 7 (7–8), \( z_{4} \) 9 (8–10), \( z_{5} \) 5 (4–7), \( Z_{1} \) 10 (8–12), \( Z_{4} \) 59 (54–69), \( Z_{5} \) 155 (145–174), \( s_{4} \) 57 (54–67), \( S_{2} \) 12 (11–13), \( S_{4} \) 10 (9–11), \( S_{5} \) 8 (8–10), \( r_{3} \) 16 (13–17), \( R_{1} \) 11 (9–12); distances between \( S_{t 1}–S_{t 3} \) 60 (57–63), \( S_{t 2}–S_{t 2} \) 68 (65–71) and \( S_{t 5}–S_{t 5} \) 69 (62–74); ventrianal shield 44 (40–49) long, 65 (61–70) wide; anal shield 50 (46–55) long, 67 (64–70) wide; movable cheliceral digit 33 (31–34) long, with 3 teeth; fixed cheliceral digit 26 (25–28) long; calyx of spermatheca 21 (18–28) long; \( S_{g 1} \) 43 (41–46), \( S_{g 2} \) 41 (38–45), \( S_{g 3} \) 45 (40–48), \( S_{t 1} \) 34 (27–38), \( S_{g 4} \) 74 (71–85), \( S_{t 2} \) 57 (52–61), \( S_{t 4} \) 65 (62–71).

**Male.** One specimen measured. Dorsal shield 253 long and 182 wide, \( j_{1} \) 22, \( j_{3} \) 31, \( j_{4} \) 7, \( j_{5} \) 7, \( j_{6} \) 8, \( j_{2} \) 10, \( j_{5} \) 7, \( z_{2} \) 8, \( z_{4} \) 8, \( z_{5} \) 7, \( Z_{1} \) 11, \( Z_{5} \) 50, \( s_{4} \) 33, \( S_{2} \) 10, \( S_{4} \) 9, \( S_{5} \) 8, \( r_{3} \).
12, \(R1\) 8; ventrianal shield 102 long and 166 wide at anterior corners; shaft of spermatodactyl 22 long; \(Sge\ I\) 30, \(Sge\ II\) 27, \(Sge\ III\) 27, \(Sti\ III\) 25, \(Sge\ IV\) 43, \(Sti\ IV\) 32, \(St IV\) 65.

**Remarks.** Measurements of the specimens collected fit the redescription given by Denmark and Muma (1989) and those of Gondim Jr. and Moraes (2001). As also reported in those publications, the specimens collected have longer \(R1\) (5 in the holotype). This is the first record of this species in Bahia.

*Amblyseius tamatavensis* Blommers

*Amblyseius tamatavensis* Blommers, 1974: 144.

*Amblyseius tamatavensis*: Moraes et al. 2004: 52.

*Amblyseius tamatavensis*: Chant and McMurtry 2007: 81.

**Specimens examined.** CEPLAC, *C. nucifera*, II-2008 (2♀), fruits, VI-2008 (2♀, 1♂), I-2009 (1♂), II-2009 (2♀), IV-2009 (2♀), VIII-2009 (1♀), X-2009 (1♀), XII-2009 (13♀); Fazenda Frupical, *M. sapientum*, VII-2007 (1♀); Fazenda Liberdade, *E. oleaceae*, V-2007 (1♀); Sítio Agrotropical, *C. nucifera*, III-2007 (1♀); Sítio Sabino, *P. edulis*, flowers, XI-2007 (2♀, 2♂).

**Female.** Seven specimens measured. Dorsal shield 352 (323–379) long and 216 (182–238) wide; \(j1\) 33 (31–36), \(j3\) 53 (50–57), \(j4\) 5 (4–5), \(j5\) 4 (3–4), \(j6\) 5 (5–6), \(J2\) 6 (5–6), \(J5\) 7 (6–7), \(z2\) 8 (7–8), \(z4\) 8 (7–8), \(z5\) 4 (3–4), \(Z1\) 6 (6–7), \(Z4\) 108 (100–115), \(Z5\) 235 (227–246), \(s4\) 91 (90–92), \(S2\) 7 (6–7), \(S4\) 6 (6–7), \(S5\) 6 (5–6), \(r3\) 14 (13–16), \(R1\) 8 (7–8); distances between \(St1–St3\) 60 (58–63), \(St2–St2\) 69 (67–72) and \(St5–St5\) 73 (70–77); ventrianal shield 113 (108–118) long, 95 (89–99) wide at level of \(ZV2\) and 85 (80–87) wide at level of anus; movable cheliceral digit 37 (36–38) long; fixed cheliceral digit 30 (27–32) long; calyx of spermatheca 17 (16–18) long; \(Sge\ I\) 40 (37–42), \(Sge\ II\) 39 (35–41), \(Sge\ III\) 57 (55–61), \(Sti\ III\) 47 (46–47), \(Sge\ IV\) 103 (100–105), \(Sti\ IV\) 77 (68–80), \(St IV\) 71 (70–72).

**Male.** Two specimens measured. Dorsal shield 259, 292 long, 177, 179 wide, \(j1\) 27, 29, \(j3\) 43, 45, \(j4\) 4, 5, \(j5\) 3, 4, \(j6\) 5, \(J2\) 5, \(J5\) 7, \(z2\) 6, \(z4\) 7, \(z5\) 3, 4, \(Z1\) 5, 6, \(Z4\) 82, 90, \(Z5\) 172, \(s4\) 67, 69, \(S2\) 6, 7, \(S4\) 6 (5–6), \(S5\) 5, \(r3\) 12 (11–12), \(R1\) 7; ventrianal shield 113 (108–118) long and 144 (137–150) wide at anterior corners; shaft of spermatodactyl 17 long; \(Sge\ I\) 32 (31–32), \(Sge\ II\) 31 (30–31), \(Sge\ III\) 38, \(Sti\ III\) 34 (33–34), \(Sge\ IV\) 67, \(Sti\ IV\) 49 (47–50), \(St IV\) 56 (55–56).

**Remarks.** Measurements of the specimens collected fit the original description. Moraes et al. (2013) reported shorter \(j1\), \(j3\), \(Sti\ III\), \(Sti\ IV\), \(St IV\), fixed and movable cheliceral digits and the width of ventrianal shield at level of \(ZV2\) [respectively, 26 (22–30), 42 (40–43), 28 (27–30), 48 (45–50), 51 (50–52), 27, 30 and 75] and longer \(J2\) and \(z2\) [respectively, 7 (7–8) and 10 (9–10)] in specimens collected in São Paulo state, southeastern Brazil.
**Arrenoseius urquharti** Yoshida-Shaul & Chant

**Amblyseius urquharti** Yoshida-Shaul & Chant, 1988: 2055.

**Fundiseius urquharti**: Moraes et al. 2004: 89.

**Arrenoseius urquharti**: Chant and McMurtry 2007: 98.

**Specimens examined.** Fazenda Monte Alegre, *M. sapientum*, V-2007 (1 ♀); Fazenda Nossa Senhora Auxiliadora, *C. nucifera*, XI-2007 (1 ♀, 1 ♂).

**Female.** Two specimens measured. Dorsal shield 384 (361–407) long, 378 (366–390) wide, *j1* 17, *j3* 27 (21–32), *j4* 5 (4–5), *j5* 4 (3–5), *j6* 6, *J2* 5 (4–5), *J5* 8 (7–9), *z2* 8 (6–9), *z4* 12 (10–13), *z5* 4 (3–4), *ZI* 4, *Z4* 111 (105–116), *Z5* 104 (95–113), *s4* 86 (79–93), *S2* 12 (11–12), *S4* 8 (7–8), *S5* 7, *r3* 12, *RI* 12; distances between *St1–St3* 49 (48–49), *St2–St2* 79 (77–80) and *St5–St5* 128 (124–132); ventrianal shield 143 (140–146) long, 220 (217–223) wide at level of *ZV2* and 142 (133–150) wide at level of anus; movable cheliceral digit 40 long, with 2 teeth; fixed cheliceral digit 32 long; calyx of spermatheca 17 (15–18) long; *St IV* 37 (35–39).

**Male.** One specimen measured. Dorsal shield 279 long and 212 wide, *j1* 19, *j3* 25 (20–30), *j4* 4, *j5* 4, *j6* 5, *J2* 3, *J5* 9, *z2* 9, *z4* 11, *z5* 3, *ZI* 6, *Z4* 74, *Z5* 59, *s4* 57 (56–58), *S2* 11, *S4* 9, *S5* 10, *r3* 12, *R1* 10; ventrianal shield 136 long and 189 wide at anterior corners; shaft of spermatodactyl 17 long; *St IV* 33.

**Remarks.** Measurements of the females collected are generally similar to those of the original description, except for the longer *Z4*, *Z5* and *s4* in the females measured in the present work [respectively, 77, 86 and 72 in the original description]. Measurements of the females collected differ from those of Moraes et al. (2013) for the shorter *j3* and the longer width of dorsal shield, *z4*, *Z4*, *S2*, *R1* and calyx of spermatheca [respectively, 33–35, 300–305, 8, 88–92, 98–103, 7–8, 7, 8, 22–23 in the latter]. This is the first record of this genus in Bahia.

**Iphiseiodes metapodalis** (El-Banhawy)

**Amblyseius metapodalis** El-Banhawy, 1984: 132.

**Iphiseiodes metapodalis**: Moraes et al. 2004: 90.

**Iphiseiodes metapodalis**: Chant and McMurtry 2007: 98.

**Specimens examined.** UESC, *E. oleracea*, VII-2007 (1 ♀), *C. nucifera*, VII-2007 (5 ♀, 1 ♂), I-2008 (2 ♀, 1 ♂), IV-2008 (1 ♀), *E. guineensis*, VII-2007 (2 ♀), *P. guajava*, VII-2007 (8 ♀, 1 ♂); CEPLAC, *C. nucifera*, fruit, IV-2009 (1 ♀); Fazenda Barra, *A. muricata*, XI-2007 (1 ♀), *T. cacao*, XI-2007 (1 ♂); Fazenda Bela Vista, *C. nucifera*, IV-2007 (2 ♀), IX-2007 (1 ♀, 1 ♂), XI-2007 (1 ♀); Fazenda Frupical, *A. muricata*, XI-2007 (1 ♀); Fazenda Liberdade, *T. cacao*, V-2007 (2 ♀), *M. indica*, V-2007 (1 ♀); Fazenda Monte Alegre, *M. sapientum*, IX-2007 (1 ♀), *C. nucifera*, IX-2007 (1 ♀), I-2008 (1 ♀), V-2008 (2 ♀), *A. muricata*, I-2008 (2 ♀); Fazenda Nossa Senhora Auxiliadora, *T. ca-
Female. Eleven specimens measured. Dorsal shield 394 (348–425) long, 313 (282–351) wide, $j_1$ 23 (20–26), $j_3$ 34 (32–37), $j_4$ 5 (4–6), $j_5$ 5 (4–6), $j_6$ 6 (5–7), $J_2$ 7 (6–8), $J_5$ 8 (7–9), $z_2$ 6 (5–7), $z_4$ 6 (5–7), $z_5$ 5 (4–7), $Z_1$ 7 (6–7), $Z_4$ 141 (128–149), $Z_5$ 192 (184–200), $s_4$ 149 (140–157), $S_2$ 7 (6–8), $S_4$ 6 (5–7), $S_5$ 6 (5–8), $r_3$ 6 (6–7), $R_1$ 7 (6–8); distances between $S_1$–$S_3$ 52 (50–55), $S_2$–$S_2$ 77 (75–79) and $S_5$–$S_5$ 103 (95–111); ventrianal shield 121 (111–130) long, 160 (152–165) wide at level of $ZV_2$ and 115 (110–120) wide at level of anus; movable cheliceral digit 34 (32–36) long, with 4 teeth; fixed cheliceral digit 27 (25–28) long, with 11 teeth; calyx of spermatheca 13 (12–15) long; $S_{ge}$ I 63 (58–68), $S_{ge}$ II 38 (34–43), $S_{ge}$ III 66 (60–71), $St_i$ III 31 (29–35), $S_{ge}$ IV 138 (130–145), $St_i$ IV 82 (76–87), $St$ IV 43 (37–47).

Male. Five specimens measured. Dorsal shield 326 (315–340) long, 243 (220–269) wide, $j_1$ 24 (23–25), $j_3$ 35 (31–39), $j_4$ 5 (4–6), $j_5$ 5 (4–6), $j_6$ 7 (6–7), $J_2$ 6 (5–7), $J_5$ 7 (6–8), $z_2$ 6 (5–7), $z_4$ 6 (6–7), $z_5$ 5 (5–6), $Z_1$ 6 (5–7), $Z_4$ 109 (105–118), $Z_5$ 182 (176–187), $s_4$ 106 (100–110), $S_2$ 7 (6–7), $S_4$ 6 (5–7), $S_5$ 6 (5–7), $r_3$ 6 (6–7), $R_1$ 6 (6–7); ventrianal shield 142 (131–145) long and 191 (186–197) wide at anterior corners; shaft of spermatodactyl 20 (20–22) long; $S_{ge}$ I 47 (45–49), $S_{ge}$ II 33 (30–35), $S_{ge}$ III 44 (42–47), $St_i$ III 28 (25–30), $S_{ge}$ IV 95 (92–98), $St_i$ IV 65 (60–70), $St$ IV 44 (42–48).

Remarks. Measurements of the specimens collected are similar to those of the original description, except for the width of dorsal shield (reported as 147 for the female holotype, probably a mistake). This is the first description of a male of this species.

Iphiseiodes setillus Gondim Jr. & Moraes

Iphiseiodes setillus Gondim Jr. & Moraes, 2001: 75.
Iphiseiodes setillus: Moraes et al. 2004: 91.
Iphiseiodes setillus: Chant and McMurtry 2007: 98.

Specimens examined. UESC, E. oleracea, VII-2007 (1♀), T. cacao, VII-2007 (1♀), I-2008 (2♀), IV-2008 (2♀); Fazenda Bela Vista, T. cacao, XI-2007 (1♀); Fazenda Frupical, T. cacao, VII-2007 (1♀).

Female. Six specimens measured. Dorsal shield 312 (256–364) long and 224 (212–246) wide, $j_1$ 8 (6–8), $j_3$ 15 (14–16), $j_4$ 15 (14–15), $j_5$ 16, $j_6$ 17 (15–18), $J_2$ 17 (17–18), $J_5$ 9 (7–9), $z_2$ 11, $z_4$ 16 (15–17), $z_5$ 14 (12–15), $Z_1$ 17 (16–18), $Z_4$ 18 (16–19), $Z_5$ 25 (21–27), $s_4$ 15 (14–16), $S_2$ 17 (16–18), $S_4$ 17 (15–18), $S_5$ 16 (14–17), $r_3$ 11 (10–11), $R_1$ 11 (11–12); distances between $S_1$–$S_3$ 41 (40–42), $S_2$–$S_2$ 60 (58–61) and $S_5$–$S_5$ 80 (76–84); ventrianal shield 77 (75–79) long, 95 (86–98) wide at level of ZV2 and 75 (73–80) wide at level of anus; movable cheliceral digit 22 (21–23) long, with 2 teeth; fixed cheliceral digit 19 (18–20) long, with 6 teeth; calyx
of spermatheca 10 (8–11) long; \(Sge \ I \ 8\ (7–8)\), \(Sge \ II \ 11\ (11–12)\), \(Sge \ III \ 13\ (13–14)\), \(Sti \ III \ 14\ (13–15)\), \(Sge \ IV \ 13\ (13–14)\), \(Sti \ IV \ 14\ (14–15)\), \(St \ IV \ 20\ (19–20)\).

**Remarks.** Measurements of specimens collected are similar to those of the original description. This is the first record of this species in Bahia.

*Iphiseiodes zuluagai* Denmark & Muma

*Iphiseiodes zuluagai* Denmark & Muma, 1972: 23.

*Iphiseiodes zuluagai*: Moraes et al. 2004: 91.

*Iphiseiodes zuluagai*: Chant and McMurtry 2007: 98.

**Specimens examined.** UESC, *C. nucifera*, VII-2007 (6♀), I-2008 (1♂), IV-2008 (1♀), *C. papaya*, V-2007 (2♀), *T. grandiflorum*, VIII-2007 (2♀), *E. guineensis*, VII-2007 (1♀), I-2008 (1♀); CEPLAC, *C. nucifera*, fruit, XII-2008 (1♀); Fazenda Barra, *A. occidentale*, VIII-2007 (1♀), *A. muricata*, XI-2007 (1♀); Fazenda Bela Vista, *T. cacao*, IV-2007 (3♀, 2♂), XI-2007 (2♀); Fazenda Formiga, *A. muricata*, VIII-2007 (1♀), *E. guineensis*, VII-2007 (1♀), I-2008 (1♀); Fazenda Terra Nova, *C. nucifera*, IX-2007 (1♀); Sítio Agrotropical, *C. nucifera*, III-2007 (1♀, 1♂); Sítio Sabino, *M. indica*, VIII-2007 (5♀).

**Female.** Thirteen specimens measured. Dorsal shield 353 (307–397) long, 291 (256–333) wide, \(j1\ 21\ (15–25)\), \(j3\ 29\ (20–35)\), \(j4\ 2\ (2–3)\), \(j5\ 3\ (2–3)\), \(j6\ 3\ (3–4)\), \(J2\ 3\ (3–4)\), \(J5\ 4\ (3–4)\), \(z2\ 3\ (2–3)\), \(z4\ 3\ (2–3)\), \(z5\ 3\ (2–3)\), \(Z1\ 3\ (2–4)\), \(Z4\ 4\ (3–5)\), \(Z5\ 131\ (105–144)\), \(s4\ 109\ (87–122)\), \(S2\ 2\ (3–4)\), \(S4\ 3\ (2–4)\), \(S5\ 3\ (2–4)\), \(r3\ 6\ (4–7)\), \(RI\ 4\ (4–5)\); distances between \(St1–St3\ 49\ (41–53)\), \(St2–St2\ 77\ (70–82)\) and \(St5–St5\ 104\ (89–115)\); ventrianal shield 99 (82–110) long, 120 (96–133) wide at level of \(ZV2\) and 88 (70–112) wide at level of anus; movable cheliceral digit 36 (34–37) long; fixed cheliceral digit 29 (25–31) long; calyx of spermatheca 7 (5–8) long; \(Sge \ I\ 51\ (40–60)\), \(Sge \ II\ 33\ (26–40)\), \(Sge \ III\ 51\ (39–59)\), \(Sti \ III\ 29\ (23–32)\), \(Sge \ IV\ 93\ (63–107)\), \(Sti \ IV\ 62\ (48–72)\), \(St \ IV\ 38\ (30–44)\).

**Male.** Eight specimens measured. Dorsal shield 287 (269–312) long, 223 (205–256) wide, \(j1\ 21\ (15–25)\), \(j3\ 37\ (32–40)\), \(j4\ 2\ (2–3)\), \(j5\ 3\ (2–3)\), \(j6\ 3\ (3–4)\), \(J^2\ 3\ (3–4)\), \(J5\ 4\ (3–5)\), \(z2\ 3\ (2–4)\), \(z4\ 3\ (2–3)\), \(z5\ 3\ (2–3)\), \(Z1\ 3\ (3–4)\), \(Z4\ 4\ (3–6)\), \(Z5\ 93\ (77–108)\), \(s4\ 82(64–92)\), \(S2\ 2\ (3–4)\), \(S4\ 3\ (2–5)\), \(S5\ 5\ (3–7)\), \(r3\ 7\ (6–8)\), \(RI\ 5\ (3–5)\); ventrianal shield 110 (100–121) long and 169 (148–187) wide at anterior corners; shaft of spermatodactyl 16 (15–18) long; \(Sge \ I\ 41\ (31–47)\), \(Sge \ II\ 30\ (24–33)\), \(Sge \ III\ 40\ (29–46)\), \(Sti \ III\ 26\ (20–33)\), \(Sge \ IV\ 65\ (52–72)\), \(Sti \ IV\ 49\ (38–56)\), \(St \ IV\ 35\ (26–46)\).

**Remarks.** Measurements of the specimens collected are similar to those of the original description, except for the longer \(r3\) and \(RI\) (2 for the holotype). The calyx of the spermatheca is shorter than reported by Lofego et al. (2009) for specimens from São Paulo state [14 (12–15)]. Measurements of male specimens fit the measurements of the allotype male and those of Lofego et al. (2004).
**Paraamblyseius multicircularis** Gondim Jr. & Moraes

*Paraamblyseius multicircularis* Gondim Jr. & Moraes, 2001: 79.
*Paraamblyseius multicircularis*: Moraes et al. 2004: 158.
*Paraamblyseius multicircularis*: Chant and McMurtry 2007: 103.

**Specimens examined.** UESC, *E. oleracea*, I-2008 (1♀), *T. cacao*, VII-2007 (3♀), I-2008 (1♀, 1♂), IV-2008 (2♀).

**Female.** Seven specimens measured. Dorsal shield 331 (302–360) long, 248 (225–270) wide, *j1* 13 (13–15), *j3* 24 (22–25), *j4* 30 (27–33), *j5* 38 (34–42), *j6* 38 (35–42), *j2* 42 (38–44), *j5* 13 (12–14), *z2* 29 (27–31), *z4* 36 (33–41), *z5* 28 (24–30), *Z1* 45 (43–49), *Z4* 44 (40–46), *Z5* 29 (27–31), *s4* 42 (37–46), *S2* 33 (30–35), *S4* 33 (31–35), *S5* 24 (23–26), *r3* 13, *R1* 17 (16–18); distances between *St1–St3* 32 (30–34), *St2–St2* 64 (62–67) and *St5–St5* 100 (95–104); ventrianal shield 110 (103–117) long, 191 (182–201) wide at level of *ZV2* and 117 (110–125) wide at level of anus; movable cheliceral digit 20 (19–21) long, with 2 teeth; fixed cheliceral digit 20 (19–21) long; calyx of spermatheca 18 (17–20) long.

**Remarks.** Measurements of the females collected are similar to those of the original description, except for longer dorsal shield (263 for the holotype). This is the first description of a male of this species and the first record of this genus in Bahia.

**Paraphytoseius orientalis** (Narayanan, Kaur & Ghai)

*Typhlodromus* (*Amblyseius*) *orientalis* Narayanan et al., 1960: 394.
*Paraphytoseius orientalis*: Moraes et al. 2004: 162.
*Paraphytoseius orientalis*: Chant and McMurtry 2007: 53.

**Specimens examined.** Fazenda Nossa Senhora Auxiliadora, *P. guajava*, XI-2007 (2♀).

**Female.** Two specimens measured. Dorsal shield 270, 282 long, 159 wide, *j1* 31, 38, *j3* 80, 88, *j4* 4, 5, *j5* 3, 5, *j6* 6, *J5* 4, *z2* 8, 9, *z4* 8, *z5* 4, 5, *Z1* 6, 7, *Z4* 69, 76, *Z5* 106, 110, *s4* 123, 127, *r3* 40, 47, *R1* 25, 26; distances between *St1–St3* 64, *St2–St2* 64 and *St5–St5* 80; ventrianal shield 85, 107 long, 55 wide at level of *ZV2* and 51 wide at level of anus; movable cheliceral digit 29, 31 long, with 2 teeth; fixed cheliceral digit 24, 25 long, with 11 teeth; calyx of spermatheca 4, 5 long; *Sge IV* 26, 31, *St IV* 36, 37, *St IV* 43, 46.

**Remarks.** Only measurements of the dorsal shield and of the longer setae were given in the original description. The specimens collected are slightly smaller and concurrently have slightly shorter setae than the holotype. Measurements of the specimens
collected are similar to those of the original description of its junior synonym, *Para-phytoseius multidentatus* Swirski & Shechter, 1961, except for the longer *Z5* (76–91 in the latter). They also are similar to the measurements provided by Lofego et al. (2009).

**Phytoscutus sexpilis** Muma

*Phytoscutus sexpilis* Muma, 1961: 275.

*Phytoscutus sexpilis*: Moraes et al. 2004: 166.

*Phytoscutus sexpilis*: Chant and McMurtry 2007: 101.

**Specimens examined.** Fazenda Nossa Senhora Auxiliadora, *P. guajava*, VII-2007 (1 ♀).

**Female.** One specimen measured. Dorsal shield 350 long, 330 wide, *j1* 15, *j3* 33, *j4* 12, *j6* 12, *J5* 9, *z2* 11, *z4* 14, *z5* 10, *Z1* 15, *Z4* 192, *Z5* 276, *s4* 184, *S4* 9, *S5* 9, *r3* 14, *R1* 16; distances between *St1–St3* 48, *St2–St2* 57 and *Sr5–Sr5* 87; ventrianal shield 137 long, 165 wide at level of *ZV2* and 128 wide at level of anus; movable cheliceral digit 25 long; fixed cheliceral digit 17 long; calyx of spermatheca 15 long; *Sge IV* 84, *St IV* 69.

**Remarks.** Measurements of the specimen collected fit the redescription of the holotype given by Yoshida-Shaul and Chant (1997), except for the shorter *j1*, *J5*, *z4*, *Z1*, *S4* and *S5* and the longer *j4* and *r3* [respectively, 21, 13, 22, 26, 13, 14, 9 and 10]. Gondim Jr. and Moraes (2001) reported specimens from São Paulo state to have longer *z2*, *z4* and *S5* [respectively, 16, 26 and 12].

**Proprioseiopsis ovatus** (Garman)

*Amblyseiopsis ovatus* Garman, 1958: 78.

*Proprioseiopsis ovatus*: Moraes et al. 2004: 184.

*Proprioseiopsis ovatus*: Chant and McMurtry 2007: 89.

**Specimens examined.** UESC, *M. sapientum*, IV-2008 (1 ♀); Fazenda Terra Nova, *E. oleracea*, I-2008 (1 ♀); Sítio Sabino, *P. edulis*, XI-2007 (1 ♀).

**Female.** Three specimens measured. Dorsal shield 366 (360–372) long, 306 (287–320) wide, *j1* 31 (30–32), *j3* 69 (63–72), *j4* 7, *j5* 4 (3–5), *j6* 12 (10–13), *J5* 9, *z2* 42 (32–50), *z4* 22 (21–23), *z5* 8, *Z1* 22 (20–24), *Z4* 110 (101–115), *Z5* 84 (79–90), *s4* 102 (92–112), *S2* 22 (21–23), *S4* 12 (11–12), *S5* 11 (10–11), *r3* 20 (20–21), *R1* 11 (10–12); distances between *St1–St3* 58 (57–58), *St2–St2* 74 (72–76) and *Sr5–Sr5* 91 (90–92); ventrianal shield 114 (113–115) long, 111 (110–112) wide at level of *ZV2* and 91 (85–96) wide at level of anus; movable cheliceral digit 32 (30–34) long; fixed cheliceral digit 31 (30–32) long; calyx of spermatheca 15 (12–15) long; *Sge II* 18 (17–18), *Sge III* 30 (29–31), *St II* 26 (25–27), *Sge IV* 61 (60–62), *St IV* 41 (35–45), *St IV* 89 (88–90).
Remarks. Measurements of the specimens collected fit the redescription of the holotype given by Moraes and McMurtry (1983), except for the shorter $S4$ and longer width of dorsal shield, $J5$ and $Sge IV$ [respectively, 23, 252, 4 and 48 in the latter]. The measurements fit the redescription given by Lofego et al. (2009) and Ferla et al. (2011) for Brazilian specimens.

Proprioseiopsis dominigos (El-Banhawy)

Amblyseius dominigos El-Banhawy, 1984: 130.
Proprioseiopsis dominigos: Moraes et al. 2004: 175.
Proprioseiopsis dominigos: Chant and McMurtry 2007: 89.

Specimens examined. Fazenda Monte Alegre, $M. sapientum$, IX-2007 (1 ♂); Sitio Agrotropical, $C. nucifera$, III-2007 (1 ♂).

Female. Three specimens measured. Dorsal shield 397 long, 307 wide, $j1$ 35, $j3$ 106 (100–114), $j4$ 3, $j5$ 3, $j6$ 4 (3–4), $J5$ 6 (5–7), $z2$ 32 (31–33), $z4$ 54 (50–57), $z5$ 3, $Z1$ 6 (5–7), $Z4$ 128 (123–131), $Z5$ 120 (114–125), $s4$ 123 (118–127), $S2$ 8 (6–10), $S4$ 8 (7–9), $S5$ 5 (5–6), $r3$ 28 (27–30), $R1$ 9 (8–9); distances between $St1–St3$ 54 (52–56), $St2–St2$ 74 (71–75) and $St5–St5$ 130 (129–130); ventrianal shield 117 (110–122) long, 138 (127–145) wide at level of $ZV2$ and 113 (110–117) wide at level of anus; movable cheliceral digit 45 long; fixed cheliceral digit 40 long; calyx of spermatheca 22 (20–25) long; $Sge I$ 31, $Sge II$ 25, $Sge III$ 31 (30–32), $Sti III$ 29 (28–30), $Sge IV$ 54 (52–56), $Sti IV$ 37 (36–37), $St IV$ 51 (46–56).

Male. One specimen measured. Dorsal shield 333 long, 230 wide, $j1$ 30, $j3$ 82, $j4$ 2, $j5$ 3, $j6$ 3, $J5$ 4, $z2$ 28, $z4$ 43, $z5$ 3, $Z1$ 5, $Z4$ 97, $Z5$ 88, $s4$ 90, $S2$ 9, $S4$ 7, $S5$ 6, $r3$ 17, $R1$ 8; ventrianal shield 148 long and 183 wide at anterior corners; shaft of spermato- dactyl 19 long; $Sge I$ 22, $Sge II$ 20, $Sge III$ 21, $Sti III$ 23, $Sge IV$ 40, $Sti IV$ 27, $St IV$ 44.

Remarks. Measurements of the specimens collected are similar to those of the original description. They also agree with those of Moraes et al. (2013), except for the longer $z2$, $z4$ and $S4$ [respectively, 21, 37 and 5 in the latter]. This is the first record of this species in Bahia.

Proprioseiopsis neotropicus (Ehara)

Amblyseius neotropicus Ehara, 1966: 133.
Proprioseiopsis neotropicus: Moraes et al. 2004: 183.
Proprioseiopsis neotropicus: Chant and McMurtry 2007: 89.

Specimens examined. UESC, $C. nucifera$, I-2008 (1 ♂); Fazenda Barra, $T. cacao$, XI-2007 (2 ♂); Fazenda Liberdade, $T. cacao$, V-2007 (1 ♂); Fazenda Monte Alegre, $M. sapientum$, I-2008 (1 ♂); Fazenda Terra Nova, $D. kaki$, V-2007 (1 ♂).
Female. Four specimens measured. Dorsal shield 424 (376–453) long, 331 (300–371) wide, j1 34 (31–36), j3 47 (46–48), j4 6 (4–7), j5 5 (5–6), j6 7 (6–8), J5 5 (5–6), z2 26 (22–29), z4 21 (17–25), z5 6 (5–7), Z1 8 (7–8), Z4 120 (112–130), Z5 106 (98–116), s4 119 (107–126), S2 8 (7–8), S4 8 (7–8), S5 8 (7–9), r3 24 (21–26), R1 13 (10–17); distances between St1–St3 66 (65–66), St2–St2 85 (82–88) and St5–St5 109 (103–117); ventrianal shield 114 (108–120) long, 115 (105–122) wide at level of ZV2 and 94 (91–97) wide at level of anus; movable cheliceral digit 40 (38–43) long, with 3 teeth; fixed cheliceral digit 33 (32–35) long; calyx of spermatheca 22 (20–25) long; Sge I 34 (32–39), Sge II 35 (33–40), Sge III 36 (34–38), Sti III 32 (31–34), Sge IV 79 (72–82), Sti IV 57 (50–65), St IV 69 (65–73).

Remarks. Measurements of the specimens collected are similar to those of the original description, except for the longer j3 and r3 (respectively 32 and 15 in the latter). They also agree with those of Lofego et al. (2004), except for the longer z4 (13 in the latter). This is the first record of this species in Bahia.

Proprioseiopsis pentagonalis (Moraes & Mesa)

Amblyseius pentagonalis Moraes et al., 1991: 127.
Proprioseiopsis pentagonalis: Moraes et al. 2004: 186.
Proprioseiopsis pentagonalis: Chant and McMurtry 2007: 89.

Specimens examined. Fazenda Monte Alegre, T. cacao, I-2008 (1 ♀).

Female. One specimen measured. Dorsal shield 328 long, 207 wide, j1 24, j3 23, j4 6, j5 6, j6 7, J5 10, z2 10, z4 11, z5 6, Z1 9, Z4 102, Z5 164, S4 74, S2 10, S4 10, S5 8, r3 18, R1 11; distances between St1–St3 63, St2–St2 69 and St5–St5 61; ventrianal shield 108 long, 85 wide at level of ZV2 and 71 wide at level of anus; movable cheliceral digit 35 long; fixed cheliceral digit 30 long; calyx of spermatheca 50 long; Sge II 25, Sge III 22, Sti III 17, Sge IV 58, Sti IV 37, St IV 52.

Remarks. Measurements of the specimen collected are similar to those of the original description and of Moraes et al. (2013) for specimens from São Paulo state. This is the first record of this species in Bahia.

Typhlodromalus peregrinus (Muma)

Typhlodromus peregrinus Muma, 1955: 270.
Typhlodromalus peregrinus: Moraes et al. 2004: 202.
Typhlodromalus peregrinus: Chant and McMurtry 2007: 111.

Specimens examined. CEPLAC, C. nucifera, fruits, XII-2008 (1 ♀), XII-2009 (1 ♀); Fazenda Barra, T. cacao, XI-2007 (1 ♀); Fazenda Bela Vista, P. guajava, IV-2007 (1 ♀), XI-2007 (1 ♀); Fazenda Kamui, C. nucifera, XI-2007 (1 ♀); Fazenda Nossa Senhora Auxiliadora, C. papaya, VII-2007 (1 ♀).
Female. Five specimens measured. Dorsal shield 351 (335–399) long, 226 (192–302) wide, j1 28 (27–29), j3 33 (31–37), j4 14 (12–15), j5 14 (11–15), j6 18 (15–20), J2 18 (14–21), J5 9 (8–10), z2 20 (18–22), z4 28 (27–30), z5 14 (11–15), Z1 25 (21–27), Z4 46 (41–52), Z5 64 (58–67), s4 41 (37–44), S2 30 (26–36), S4 25 (19–27), S5 12 (9–14), r3 20 (18–21), RI 16 (15–17); distances between St1–St3 64 (62–65), St2–St2 61 (60–63) and St5–St5 72 (69–74); ventrianal shield 109 (102–114) long, 64 (62–66) wide at level of ZV2 and 61 (59–63) wide at level of anus; movable cheliceral digit 33 (30–35) long, with 3 teeth; fixed cheliceral digit 28 (25–30) long; calyx of spermatheca 22 (15–24) long; Sge I 15 (10–18), Sge II 18 (15–21), Sge III 28 (25–30), Sti III 18 (16–19), Sge IV 44 (39–47), Sti IV 21 (17–29), St IV 62 (58–70).

Remarks. Setal measurements were not given in the original description. Measurements of the specimens collected are similar to those of McMurtry (1983), except for the longer ZI (16-17 in the latter); they also agree with the redescription given by Moraes et al. (2013).

Typhlodromips mangleae De Leon

Typhlodromips mangleae De Leon, 1967: 28.
Typhlodromips mangleae: Moraes et al. 2004: 217.
Typhlodromips mangleae: Chant and McMurtry 2007: 63.

Specimens examined. Sítio São Jorge, C. nucifera, XI-2007 (1 ♀).

Female. One specimen measured. Dorsal shield 343 long and 220 wide, j1 18, j3 20, j4 10, j5 10, j6 11, J2 12, J5 9, z2 11, z4 10, z5 10, Z1 12, Z4 36, Z5 73, s4 22, S2 12, S4 10, S5 8, r3 14, RI 14; distances between St1–St3 56, St2–St2 62 and St5–St5 63; ventrianal shield 115 long, 87 wide at level of ZV2 and 85 wide at level of anus; movable cheliceral digit 27 long; fixed cheliceral digit 23 long; calyx of spermatheca 5 long; Sge I 27, Sge II 26, Sge III 31, Sti III 24, Sge IV 43, Sti IV 36, St IV 53.

Remarks. Measurements of the specimens collected are similar to those of the original description, except for shorter calyx of spermatheca (9 in the holotype). Lofego et al. (2004, 2009) reported a slightly longer Z4 [respectively, 39 (37–41) and 38 (35–45)]. Measurements of the specimens collected are similar to those of Gondim Jr. and Moraes (2001). This is the first record of this species in Bahia.

Typhlodromips theobromae Souza, Oliveira & Gondim Jr.

Typhlodromips theobromae: Souza et al. 2010: 49.

Specimens examined. UESC, T. cacao, VII-2007, IV-2008 (3 ♀, 2 ♂); Fazenda Monte Alegre, T. cacao, V-2007 (1 ♀), M. indica, V-2008 (2 ♀, 3 ♂); Fazenda Terra Nova, T. cacao, IX-2007, I-2008 (4 ♀).
Female. Ten specimens measured. Dorsal shield 301 (288–312) long, 211 (194–246) wide; $j_1$ 19 (17–21), $j_3$ 23 (17–26), $j_4$ 8 (6–10), $j_5$ 8 (6–10), $j_6$ 10 (8–12), $J_2$ 10 (8–15), $J_5$ 7 (7–8), $z_2$ 10 (8–12), $z_4$ 18 (16–21), $z_5$ 7 (6–9), $Z_1$ 13 (8–17), $Z_4$ 45 (43–47), $Z_5$ 56 (46–60), $s_4$ 23 (20–25), $s_5$ 15 (11–19), $S_4$ 10 (6–16), $S_5$ 9 (6–11), $r_3$ 11 (10–12), $R_1$ 9 (7–10); distances between $St_1$–$St_3$ 58 (55–60), $St_2$–$St_2$ 72 (68–74) and $St_5$–$St_5$ 65 (61–65); ventrianal shield 88 (82–93) long, 91 (86–93) wide at level of $ZV_2$ and 74 (70–79) wide at level of anus; movable cheliceral digit 39 (38–40) long, with 3 teeth; fixed cheliceral digit 30 long, with 15 teeth; calyx of spermatheca 9 (7–10) long; $S_{ge}$ II 14 (12–16), $S_{ge}$ III 15 (14–18), $St_{i}$ III 14 (12–15), $S_{ge}$ IV 31 (27–35), $St_{i}$ IV 15 (12–18), $St_{i}$ IV 28 (25–30).

Male. Five specimens measured; dorsal shield 229 (212–241) long and 160 (152–176) wide; $j_1$ 16 (14–18), $j_3$ 22 (19–24), $j_4$ 9 (8–9), $j_5$ 8 (8–9), $j_6$ 10 (9–10), $J_2$ 8 (8–9), $J_5$ 6 (5–6), $z_2$ 10 (8–11), $z_4$ 19 (17–22), $z_5$ 7 (7–8), $Z_1$ 9 (8–10), $Z_4$ 33 (31–35), $Z_5$ 36 (33–39), $s_4$ 21 (20–22), $S_2$ 13 (12–14), $S_4$ 9 (8–10), $S_5$ 7 (6–7), $r_3$ 12 (11–12), $R_1$ 8 (7–10); ventrianal shield 91 (87–96) long and 132 (128–138) wide at anterior corners; shaft of spermatodactyl 15 long; $S_{ge}$ I 13 (12–14), $S_{ge}$ II 12 (12–13), $S_{ge}$ III 12 (11–13), $St_{i}$ III 12 (11–13), $S_{ge}$ IV 19 (18–20), $St_{i}$ IV 14 (12–16), $St_{i}$ IV 24 (23–25).

Remarks. Measurements of the specimens collected are similar to those of the original description.

Phytoseiinae Berlese

Phytoseius latinus El-Banhawy

Phytoseius latinus El-Banhawy, 1984: 141.

Phytoseius latinus: Moraes et al. 2004: 217.

Phytoseius latinus: Chant and McMurtry 2007: 129.

Specimens examined. Fazenda Bela Vista, *P. guajava*, IV-2007 (7 ♀, 6♂), VII-2007 (4♀, 2♂), VIII-2007 (1♀), XI-2007 (1♀).

Female. Five specimens measured. Dorsal shield 272 (256–302) long, 135 (128–148) wide; $j_1$ 19 (18–20), $j_3$ 32, $j_4$ 7 (7–8), $j_5$ 7, $j_6$ 9 (8–10), $J_2$ 9 (8–10), $J_5$ 7 (6–8), $z_2$ 10 (9–10), $z_3$ 37 (35–38), $z_4$ 11 (10–11), $z_5$ 7 (6–7), $Z_4$ 47 (45–50), $Z_5$ 52 (50–55), $s_4$ 51 (48–55), $s_6$ 59 (56–62), $r_3$ 36 (33–37), $R_1$ 14 (13–16); distances between $St_1$–$St_3$ 62 (60–64), $St_2$–$St_2$ 64 (63–65) and $St_5$–$St_5$ 53 (52–55); ventrianal shield 90 (85–94) long, 51 (48–55) wide at level of ZV2 and 45 (40–49) wide at level of anus; movable cheliceral digit 29 (28–30) long; fixed cheliceral digit 25 (24–26) long; calyx of spermatheca 15 (15–16) long; $S_{ge}$ IV 29 (27–30), $St_{i}$ IV 28 (27–29), $St_{i}$ IV 29 (27–30).

Male. Two specimens measured. Dorsal shield 228, 236 long, 115, 123 wide, $j_1$ 15, 16, $j_3$ 28, 29, $j_4$ 7, 8, $j_5$ 6, 8, $j_6$ 7, 9, $J_2$ 7, $J_5$ 6, $z_2$ 8, 10, $z_3$ 31, 32, $z_4$ 9, 10, $z_5$ 6, 7, $Z_4$ 32, 33, $Z_5$ 27, 30, $s_4$ 37, 38, $s_6$ 43, 45, $r_3$ 28, 30, $R_1$ 10, 11; ventrianal shield
Phytoseiid mites from tropical fruit trees in Bahia State, Brazil (Acari, Phytoseiidae)

Remarks. The females collected differ from the original description by having longer $j_3$ and $Z_4$ and shorter $j_4$, $j_5$ and $z_4$ (respectively 24, 36, 10, 17 and 15 in the holotype). This is the first record of this species in Bahia.

Phytoseius woodburyi De Leon

Phytoseius (Phytoseiidae) woodburyi De Leon, 1965: 130.
Phytoseius woodburyi: Moraes et al. 2004: 246.
Phytoseius woodburyi: Chant and McMurtry 2007: 131.

Specimens examined. Fazenda Bela Vista, C. nucifera, XI-2007 (1 ♀), P. guajava VII-2007 (1 ♀).

Female. Five specimens measured. Dorsal shield 279 (265–310) long, 145 (140–150) wide, $j_1$ 29 (28–31), $j_3$ 33 (33–35), $j_4$ 5 (5–6), $j_5$ 5 (5–6), $j_6$ 5 (5–6), $J_5$ 6 (5–8), $z_2$ 13 (13–15), $z_3$ 30 (28–33), $z_4$ 12 (10–13), $z_5$ 6 (5–8), $Z_4$ 87 (85–91), $Z_5$ 73 (68–78), $s_4$ 118 (110–125), $s_6$ 78 (73–82), $r_3$ 43 (40–46); distances between $St_1$–$St_3$ 55 (53–58), $St_2$–$St_2$ 58 (55–60) and $St_5$–$St_5$ 58 (55–61); ventrianal shield 77 (65–99) long, 32 (28–45) wide at level of $Z_2$ and 39 (35–47) wide at level of anus; movable cheliceral digit 21 (18–25) long; fixed cheliceral digit 21 (20–23) long; calyx of spermatheca 8 (6–10) long; $S_4$ IV 8 (8–9), $St_4$ IV 49 (46–52), $St_4$ IV 27 (24–30).

Remarks. Measurements of the specimens collected are similar to those of the original description, except for the longer $St_4$ IV (20 in the holotype). Specimens collected in this study have the ventrianal shield longer than reported by Gondim Jr. and Moraes (2001) for specimens from São Paulo state [53 (50–58) in the latter]. This is the first record of this species in Bahia.

Typhlodrominae Wainstein

Cocoseius elsalvador Denmark & Andrews

Cocoseius elsalvador Denmark & Andrews, 1981: 155.
Cocoseius elsalvador: Moraes et al. 2004: 263.
Cocoseius elsalvador: Chant and McMurtry 2007: 132.

Specimens examined. Fazenda Terra Nova, T. cacao, IX-2007 (1 ♀), C. nucifera, IX-2007 (2 ♀); Sitio São Jorge, C. nucifera, XI-2007 (2 ♀).

Female. Five specimens measured. Dorsal shield 302 (279–315) long, 166 (154–192) wide; $j_1$ 27 (25–28), $j_3$ 54 (51–56), $j_4$ 34 (32–37), $j_5$ 52 (50–55), $j_6$ 66 (62–70), $J_2$ 63 (58–67), $J_5$ 28 (22–31), $z_2$ 21 (20–21), $z_3$ 31 (30–32), $z_4$ 73 (68–77), $z_5$ 34
(29–37), z6 93 (88–98), Z4 74 (68–79), Z5 77 (73–81), s4 79 (77–82), S4 75 (69–80), r3 42 (37–46), R1 72 (67–75); distances between St1–St3 55 (54–56), St2–St2 60 (57–63) and St5–St5 59 (57–62); ventrianal shield 70 (63–75) long, 60 (50–64) wide at level of ZV2 and 59 (55–63) wide at level of anus; movable cheliceral digit 26 (25–26) long; fixed cheliceral digit 25 (23–26) long; calyx of spermatheca 21 (20–23) long; Sge IV 49 (46–52), Sti IV 37 (34–40), St IV 76 (73–79).

Remarks. Measurements of the specimens collected are similar to those of the original description, except for the longer Sge IV and Sti IV (respectively 39 and 25 in the holotype). Gondim Jr. and Moraes (2001) reported specimens from Pernambuco state to have longer z2 [27 (25–29)].

Cocoseius palmarum Gondim Jr., Moraes & McMurtry

Cocoseius palmarum Gondim Jr. et al., 2000: 1226.
Cocoseius palmarum: Moraes et al. 2004: 263.
Cocoseius palmarum: Chant and McMurtry 2007: 134.

Specimens examined. UESC, C. nucifera, VII-2007 (3 ♀), I-2008 (1 ♀), IV-2008 (1 ♀); Fazenda Formiga, C. nucifera, VIII-2007 (1 ♀); Fazenda Terra Nova, C. nucifera, IX-2007 (1 ♀), I-2008 (2 ♀).

Female. Eight specimens measured. Dorsal shield 270 (265–275) long, 182 (161–189) wide, j1 25 (23–27), j3 41 (38–45), j4 54 (52–59), j5 61 (57–64), j6 68 (65–70), J2 68 (65–72), J5 12 (11–13), z2 26 (21–28), z3 34 (31–36), z4 69 (65–75), z5 34 (31–38), z6 88 (85–92), Z4 73 (70–75), Z5 69 (67–71), s4 76 (72–81), S4 64 (60–68), r3 57 (52–65), R1 54 (50–59); distances between St1–St3 48 (46–50), St2–St2 55 (53–57) and St5–St5 63 (60–66); ventrianal shield 93 (88–94) long, 70 (67–73) wide at level of ZV2 and 63 (60–65) wide at level of anus; movable cheliceral digit 25 (23–26) long, with 1 teeth; fixed cheliceral digit 24 (22–25) long, with 3 teeth; calyx of spermatheca 16 (15–18) long; Sge IV 37 (36–40), Sti IV 26 (25–28), St IV 53 (50–56).

Remarks. Measurements of the specimens collected are similar to those of the original description, except for a slightly shorter calyx of spermatheca [21 (20–23) in the original description]. This is the first record of this species in Bahia.

Leonseius regularis (De Leon)

Typhloseiopsis regularis De Leon, 1965: 123.
Leonseius regularis: Moraes et al. 2004: 275.
Leonseius regularis: Chant and McMurtry 2007: 161.

Specimens examined. UESC, T. cacao, VII-2007 (7 ♀), I-2008 (5 ♀), E. guineensis, VII-2007 (1 ♂), A. integrifolia, VII-2007 (2 ♀); Fazenda Bela Vista, T. cacao, IV-2007.
Phytoseiid mites from tropical fruit trees in Bahia State, Brazil (Acari, Phytoseiidae)

Female. Twelve specimens measured. Dorsal shield 366 (333–397) long, 257 (212–282) wide, $j_1$ 28 (25–30), $j_3$ 38 (35–42), $j_4$ 4 (3–5), $j_5$ 4 (3–5), $j_6$ 5 (5–6), $J_2$ 6 (5–8), $J_5$ 8 (7–9), $z_2$ 4 (3–5), $z_3$ 11 (9–14), $z_4$ 6 (5–7), $z_5$ 4 (3–5), $Z_4$ 101 (85–111), $Z_5$ 276 (262–292), $s_4$ 89 (71–98), $s_6$ 8 (6–12), $S_5$ 6 (5–7), $r_3$ 10 (8–12), $R_1$ 9 (7–11); distances between $S_{t1}$–$S_{t3}$ 61 (59–66), $S_{t2}$–$S_{t2}$ 70 (67–73) and $S_{t5}$–$S_{t5}$ 73 (70–76); ventrianal shield 115 (98–128) long, 63 (55–70) wide at level of $Z_{V2}$ and 64 (55–70) wide at level of anus; movable cheliceral digit 32 (30–33) long, with 4 teeth; fixed cheliceral digit 28 (25–30) long; calyx of spermatheca 18 (17–18) long; $S_{ge}$ I 54 (50–57), $S_{ge}$ II 40 (37–43), $S_{ge}$ III 51 (47–55), $S_{ti}$ III 38 (33–44), $S_{ge}$ IV 119 (107–128), $S_{ti}$ IV 68 (55–82), $St_{IV}$ 54 (48–60).

Male. Four specimens measured. Dorsal shield 258 (243–266) long, 171 (166–179) wide, $j_1$ 22 (20–24), $j_3$ 32 (30–34), $j_4$ 5 (4–6), $j_5$ 5 (4–6), $j_6$ 6 (5–7), $J_2$ 6 (4–8), $J_5$ 7 (6–8), $z_2$ 4 (3–5), $z_3$ 10 (8–12), $z_4$ 5 (4–7), $z_5$ 4 (3–5), $Z_4$ 63 (62–64), $Z_5$ 193 (185–202), $s_4$ 51 (48–55), $s_6$ 8 (6–10), $S_5$ 6 (5–8), $r_3$ 10 (8–11), $R_1$ 7 (7–8); ventrianal shield 111 (107–115) long and 141 (138–146) wide at anterior corners; shaft of spermatodactyl 18 (17–18) long; $S_{ge}$ I 54 (50–57), $S_{ge}$ II 40 (37–43), $S_{ge}$ III 51 (47–55), $S_{ti}$ III 38 (33–44), $S_{ge}$ IV 119 (107–128), $S_{ti}$ IV 68 (55–82), $St_{IV}$ 54 (48–60).

Remarks. Measurements of the specimens collected are similar to those of the original description, except for the shorter $s_4$ (105 in the holotype). They also agree with those reported by Moraes et al. (2013). This is the first record of this genus in Bahia.

Metaseiulus ferlai Moraes, McMurtry & Lopes

Metaseiulus (Metaseiulus) ferlai Moraes et al., 2006: 352.
Metaseiulus ferlai: Chant and McMurtry 2007: 174.

Specimens examined. Fazenda Barra, A. occidentale, VIII-2007 (1 ♂).

Female. One specimen measured. Dorsal shield 350 long, 189 wide, $j_1$ 21, $j_3$ 21, $j_4$ 14, $j_5$ 14, $j_6$ 17, $J_2$ 20, $J_5$ 9, $z_2$ 17, $z_3$ 18, $z_4$ 20, $z_5$ 15, $Z_4$ 30, $Z_5$ 29, $s_4$ 21, $s_6$ 24, $S_2$ 24, $S_5$ 21, $r_3$ 21, $R_1$ 21; distances between $S_{t1}$–$S_{t3}$ 63, $S_{t2}$–$S_{t2}$ 66 and $S_{t5}$–$S_{t5}$ 58; ventrianal shield 116 long, 87 wide at level of $Z_{V2}$ and 85 wide at level of anus; movable cheliceral digit 31 long; fixed cheliceral digit 29 long; calyx of spermatheca 25 long.

Remarks. Measurements of the specimens collected fit the original description. This is the first record of this genus in Bahia.
Typhlodromina subtropica Muma & Denmark

Typhlodromina subtropica Muma & Denmark, 1969: 412.
Typhlodromina subtropica: Moraes et al. 2004: 305.
Typhlodromina subtropica: Chant and McMurtry 2007: 169.

Specimens examined. Fazenda Terra Nova, D. kaki, V-2007 (1 ♀).

Female. One specimen measured. Dorsal shield 353 long, 262 wide, j1 22, j4 35, j5 31, J2 46, J5 13, z2 32, z3 37, z4 43, z5 35, Z4 57, Z5 51, s4 43, s6 55, S5 54, r3 30, R1 21; distances between St1–St3 56, St2–St2 61 and St5–St5 77; ventrianal shield 125 long, 90 wide at level of ZV2 and 72 wide at level of anus; movable cheliceral digit 28 long; fixed cheliceral digit 22 long; calyx of spermatheca 20 long.

Remarks. Measurements of the specimens collected fit the redescription of the holotype given by Moraes and McMurtry (1983), except for the longer Z5 (42 in the holotype).

Typhlodromus (Anthoseius) transvaalensis (Nesbitt)

Kampimodramus transvaalensis Nesbitt, 1951: 55.
Typhlodromus (Anthoseius) transvaalensis: Moraes et al. 2004: 355.
Typhlodromus (Anthoseius) transvaalensis: Chant and McMurtry 2007: 169.

Specimens examined. CEPLAC, C. nucifera, fruit, VII-2008 (1 ♀).

Female. One specimen measured. Dorsal shield 369 long, 205 wide, j1 30, j3 38, j5 30, J2 42, J5 9, z2 22, z3 40, z4 42, z5 26, Z4 51, Z5 60, s4 44, s6 48, S2 52, S4 53, S5 9, r3 34, R1 37; distances between St1–St3 64, St2–St2 62 and St5–St5 71; ventrianal shield 120 long, 69 wide at level of ZV2 and 66 wide at level of anus; movable cheliceral digit 30 long; fixed cheliceral digit 29 long; Sge IV 22, Sti IV 30, St IV 46.

Remarks. Measurements of the specimen collected agree with the redescription of the holotype given by Schicha (1981), except the longer j1 (23 in the holotype). They are similar to measurements given by Ferla et al. (2011), except for the shorter j3 (48 in the latter).

Key to the phytoseiid species collected in the present work (females)

1 Setae z3 and/or s6 present ........................................................................................................2
– Setae z3 and s6 absent ...........................................................................................................3
2 Setae Z1, S2, S4 and S5 present; seta r3 inserted on dorsal shield .........................23
– At last one of the setae Z1, S2, S4 or S5 present; seta r3 inserted on unsclerotised cuticle ...........................................................................................................24
3 Posterior margin of sternal shield lightly sclerotized, often indistinct, with a posteromedian projection ..........................................................................................4
Posterior margin of sternal shield distinct, without a postero-median projection

…………………………………………………………………………………………………………………………….. 5

Ratio $s4:Z1> 3$; seta $Z4$ not as long as distance between its base and base of $S4$; dorsal shield mostly smooth, with few anterolateral striae .................................................................

…………………………………………………………………………………………………………………………….. Amblydromalus manihoti (Moraes)

– Ratio $s4:Z1< 3$; seta $Z4$ longer than distance between its base and base of $S4$; dorsal shield reticulated.................. Typhlodromalus peregrinus (Muma)

Setae $J2$, $S2$, $S4$ and $S5$ absent; lateral margin of dorsal shield with distinct incision at level of $s4$; setae $j3$, $s4$, $Z4$ and $Z5$ thickened, strongly serrate, inserted on tubercles ... Paraphytoseius orientalis (Narayanan, Kaur & Ghai)

– Setae $J2$ and $S2$ present or absent, $S4$ and $S5$ present; lateral margin of dorsal shield without distinct incision at level of $s4$; setae $j3$, $s4$, $Z4$ and $Z5$ not markedly thickened, smooth to lightly serrate, not inserted on tubercles..... 6

Ratio $s4:Z1< 4$; body never red or dark brown; seta $J2$ present.............

– Ratio $s4:Z1> 4$ (except for Iphiseiodes setillus and Paraamblyseius multicircularis); some species heavily sclerotized, body red or dark brown; seta $J2$ present or absent.................................................................................................... 8

Calyx of spermatheca dish-shaped; seta $Z4$ not as long as distance between its base and base of $S5$; $Sge$ IV sharp-tipped... Typhlodromips mangleae De Leon

– Calyx of spermatheca short-tubular; seta $Z4$ at least as long as distance between its base and base of $S5$; $Sge$ IV with tiny knob...............................................................

…………………………………………………………………………………………………………………………. Typhlodromips theobroma Souza, Oliveira & Gondim Jr.

8 All shields generally strongly sclerotized; sternal shield usually wider than long; ventrianal shield usually as wide as long or wider than long; setae $z2$ and/or $z4$ rarely short/ minute........................................................................ 12

– All shields lightly sclerotized; sternal shield about as wide as long; ventrianal shield longer than wide; setae $z2$ and $z4$ usually short/ minute........... 14

13 Except for $j1$, $j3$, $s4$ and $Z5$, dorsal shield setae short/ minute; setae $S4$ and $Z5$ considerably longer than others; setae $Z5$, $Sge$ IV and $Sti$ IV knobbed........

………………………………………………………………………………………………………………………….. Iphiseiodes zuluagai Denmark & Muma
– Dorsal shield setae of medium lengths, none considerably longer than others; setae Z5, Sge IV and Sti IV sharp-tipped ...........................................

.......................................................

Iphiseiodes setillus Gondim Jr. & Moraes

14 Dorsal, genital and ventrianal shields with circular ornamentation; dorsal shield setae of medium length, none considerably longer than others; seta ZV3 absent; with a pair of enlarged metapodal plates; leg macrosetae absent ...........

...................................................

Paraamblyseius multicircularis Gondim Jr. & Moraes

– Dorsal, genital and ventrianal shields reticulate; some dorsal shield setae much longer than others; seta ZV3 present; with 2 pairs of metapodal plates, none distinctly enlarged; St IV present

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Arrenoseius urquharti (Yoshida-Shaul & Chant)

15 Calyx of spermatheca tubular, flared near vesicle and inflate near atrium, longer than 40 μm ..............Proprioseiopsis pentagonalis (Moraes & Mesa)

– Calyx of spermatheca saccular or funnel-shaped, shorter than 30 μm........

16 Seta j3 at most 1.2 times longer than distance between their bases; calyx saccular ..........................................................

..........................................................

Proprioseiopsis neotropicus (Ehara)

– Seta j3 at least 1.5 times longer than distance between their bases; calyx funnel-shaped ..........................................................

..........................................................

Proprioseiopsis dominigos (El-Banhawy)

– Seta j3 longer than 100 μm; seta Z5 longer than 110 μm; seta z2 shorter than z4; calyx longer than 20 μm........ Proprioseiopsis dominigos (El-Banhawy)

– Seta j3 shorter than 75 μm; seta Z5 shorter than 100 μm; seta z2 longer than z4; calyx shorter than 20 μm........ Proprioseiopsis ovatus (Garman)

18 Ventral shield separated from anal shield...Amblyseius perditus Chant & Baker

– Ventral and anal shields fused, constituting a ventrianal shield................

19 Calyx of spermatheca shorter than 13 μm; less than 4 times as long as width at median length..................................................

..........................................................

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Amblyseius impeltatus Denmark & Muma

– Zeta Z4 longer than distance between its base and base of Z5; setae s4 and Z4 respectively 41–44 and 30–33 μm long; calyx cup-shaped, 6 μm long, increasing progressively in diameter toward the base...

..........................................................

Amblyseius aerialis (Muma)

– Seta j1, j3, s4, Z4 and Z5 respectively 23–26, 35–39, 56–61, 60–66 and 130–155 μm long..........Amblyseius igarassuensis Gondim Jr. & Moraes

– Seta j1, j3, s4, Z4 and Z5 respectively 23–42, 42–55, 91–120, 115–148 and 223–307 μm long........................Amblyseius operculatus De Leon

22 Seta s4, Z4 e Z5 respectively 105–111, 120–143 and 271–315 μm long; atrium nodular, distinct; major duct narrower than calyx......

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Amblyseius aerlalis (Muma)
Phytoseiid mites from tropical fruit trees in Bahia State, Brazil (Acari, Phytoseiidae)

Setae s4, Z4 e Z5 respectively 90–92, 100–115 and 227–246 μm long; atrium small, indistinct, incorporated into base of calyx; major duct approximately of the same diameter as calyx ...........Amblyseius tamatavensis Blommers

Phytoseius latinus El-Banhawy

Setae J2 and R1 present; seta s4 shorter than s6; insertions of setae Z4 and Z5 distinctly separated; each macroseta of leg IV with a tiny knob, none markedly shorter than others ....................Phytoseius woodburyi (De Leon)

Phytoseius woodburyi (De Leon)

Seta S5 absent; ventrianal shield with 1 or 3 pairs of pre-anal setae; dorsal shield setae not distally swollen ..................25

Phytoseius woodburyi (De Leon)

Seta S5 present; ventrianal shield with 4 pairs of pre-anal setae (if with 3 pairs, then most dorsal shield setae distally swollen) .................26

Phytoseius woodburyi (De Leon)

Dorsal shield lightly reticulate; ventrianal shield with one pair of preanal setae; seta ZV3 present .............Cocoseius elsalvador Denmark & Andrews

Cocoseius palmarum Gondim Jr., Moraes & McMurtry

Dorsal shield smooth, except for a few anterolateral striae; ventrianal shield with 3 pairs of preanal setae; seta ZV3 absent.................................

Cocoseius elsalvador Denmark & Andrews

Leonseius regularis (De Leon)

Dorsal shield, except j1, j3, s4, Z4 and Z5, short/ minute; setae s4, Z4 and Z5 greatly longer than other dorsal setae; setae JV4 and ZV3 present .................

Leonseius regularis (De Leon)

Pattern of dorsal setae lengths not as above; seta JV4 absent; seta ZV3 present or absent .........................................................28

Leonseius regularis (De Leon)

Seta S2 absent, seta ZV3 present; seta R1 inserted on unsclerotized cuticle; seta s6 over twice as long as R1; seta S5 longer than distance between its base and base of Z5 .........Typhlodromina subtropica Muma & Denmark

Seta S2 present, seta ZV3 absent; seta R1 on dorsal shield; seta s6 less than twice as long as R1; seta S5 not as long as distance between its base and base of Z5 ..................Metaseiulus ferlai Moraes, McMurtry & Lopes

Discussion

Fifty-one phytoseiid species have been reported from Bahia (Bonato et al. 1999; Denmark and Muma 1973; Farias et al. 1981; Fiaboe et al. 2004, 2007; Lawson-Balagbo et al. 2008; Lofego et al. 2000, 2013; Moraes et al. 1993, 1994, 1997; Moraes and Denmark 1999; Moraes and McMurtry 1983; Noronha et al. 1997; Noronha and Moraes 1989; Oliveira et al. 2007; Souza et al. 2010, 2012). In the present study, fifteen species are reported for the first time in that state, raising the number of known species to sixty-six.
By far most of the species and of the specimens collected belong to Amblyseiinae (72 and 81%, respectively), followed by the Typhlodrominae (21 and 13%) and the Phytoseiinae (7 and 6%). Similar patterns were summarized by Castro and Moraes (2010) for similar surveys conducted in the Atlantic Forest of southeastern Brazil. There was a general trend for less specific phytoseiid species, i.e., those found on larger number of host plants, to be most abundant. Most of the phytoseiid species was found on a single or few host species. The largest numbers of phytoseiids on C. nucifera, T. cacao and P. guajava suggest that the microhabitat on the leaves of these plants favor these predators, but should not be taken to indicate the preference of these mites for those plants, given that the collecting effort was not the same on all plant species. These higher numbers could be due to the fact that these plants were among the most common in the localities where the study was conducted.

The most diverse genus in the present study was Amblyseius, as also found by Lawson-Balagbo et al. (2008) on coconut palm in the coastal region of Bahia. Amblyseius operculatus was the most abundant species and the species found in the largest number of plants. In total, the total number of specimens of this species was higher than the sum of the second and third most common species, and they were found in every month of the year, except (probably by chance) in February.

A noticeable absence in this study was mites belonging to the genus Euseius Wainstein. Although species of this genus have been reported as diverse and numerous in surveys conducted on different crops in the inland semiarid region of Bahia (Moraes et al. 1993; Moraes and McMurtry 1983), they were not found in the present study nor in previous surveys conducted in the southern coastal region of Bahia (A.R. Oliveira, personal observation) on different plant species.

Total annual rainfall in the semiarid region in the inland of Bahia ranges between 700 and 1,300 mm (Moraes et al. 1993; Moraes and McMurtry 1983), whereas in southern coast it is approximately 1,700 mm, with no pronounced dry season (Almeida and Valle 2010). Daud and Feres (2005) reported significant correlations between the population levels of Euseius citrifolius Denmark & Muma and rainfall (negative) or pollen abundance (positive). Pollen is known to constitute an important part of the diet of Euseius species (McMurtry et al. 2013). Thus, the apparent absence (or scarcity) of Euseius species in the present work could be related to the high rainfall in the southern coastal region and low pollen availability in the tropical fruit trees plantations surveyed. Species of this genus were not rare in a similar survey conducted in the coast of São Paulo state (Castro and Moraes 2010), where rainfall is quite similar to that reported in the southern coastal region of Bahia (Climate-Data.org 2015). This apparent discrepancy could be related to the fact that in that study these species were only found on plants of spontaneous growth, which could be protected at a certain level from the direct effect of rainfall. Those were not sampled in the present study.

The results of this study may contribute to the determination of future research themes, to subsidize future implementation of the use of phytoseiids as biological control agents in the region where the study was conducted. A next step in this trajectory
could involve studies under controlled laboratory conditions to evaluate the interactions between the most common predators found and the most common pest species.

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