
Review about mites (Acari) of rubber trees (*Hevea* spp., Euphorbiaceae) in Brazil¹

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Abstract

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Two of the most economically important superfamilies of phytophagous mites are Tetranychoida and Eriophyoidea, which have species represented in rubber trees in Brazil. In this paper we review the literature concerning the mite fauna registered on rubber trees in that country. The source was the information available on literature, but also data from exploratory samplings in Goianésia, State of Goiás, and from a triennial survey with monthly samplings in Cedral, State of São Paulo. Among the phytophagous mites the most important and abundant species were *Calacarus heveae* and *Tenuipalpus heveae*. Seven of the nominal species reported belong to the family Tetranychidae. *Eutetranychus banksi* and *Oligonychus gossypii* were very numerous in several crops studied, although with no evident damage to the leaves caused by the former. The richest family was Phytoseiidae (27 species). Other rich and numerous family with predatory species was Stigmaeidae (10). The study of mites associated with rubber trees was triggered after the discovery of *Calacarus heveae*, after what several works arose in order to understand the seasonal occurrence of mites on that culture, their biology, chemical control and influence of associated vegetation. Not surprisingly, most surveys were made in the State of São Paulo, which responds to up to 60% of the national latex yield. Whereas in some rubber tree crops there were made seasonal samplings, most of the surveys had only few isolated samplings.

Key words: Biodiversity, faunistics, mites, rubber tree

Resumo

Hernandes, F.A. and Feres, R.J.F. **Revisão sobre ácaros (Acari) de seringueiras (*Hevea* spp., Euphorbiaceae) no Brasil.** *Biota Neotrop.* Jan/Abr 2006, vol. 6, no. 1, <http://www.biotaneotropica.org.br/v6n1/pt/abstract?article+bn00406012006>. ISSN 1676-0611

Duas das superfamílias economicamente mais importantes de ácaros fitófagos são Tetranychoida e Eriophyoidea, que apresentam espécies presentes no cultivo de seringueira no Brasil. No presente trabalho é revisada a literatura referente à acarofauna registrada em seringueiras no Brasil. O material utilizado foi o disponível na literatura, sendo também incluídos dados de coletas exploratórias esporádicas em Goianésia, Estado de Goiás, e de levantamentos mensais durante três anos em Cedral, noroeste do Estado de São Paulo, Brasil. Entre os ácaros fitófagos, os de maior importância e que ocorreram em maior abundância foram *Calacarus heveae* e *Tenuipalpus heveae*. Sete das espécies nominais registradas pertencem à família Tetranychidae. Dentre elas, *Eutetranychus banksi* e *Oligonychus gossypii* ocorreram em grande abundância em diversos seringais estudados, a primeira delas, entretanto, sem causar dano aparente às folhas. A família com maior número de espécies (27) foi Phytoseiidae. Outra família com espécies predadoras bastante abundante foi Stigmaeidae (10). O estudo de ácaros associados à seringueira ganhou impulso após a descrição de *Calacarus heveae*, quando houve incremento dos trabalhos visando melhor compreensão da sazonalidade, biologia, controle químico e influência da vegetação vizinha e associada a seringueiras. A grande maioria das coletas realizadas em seringais paulistas é reflexo do maior número de pesquisadores e da maior produtividade que esse Estado apresenta, respondendo por mais de 60% da produção nacional de látex. Enquanto que em alguns seringais foram feitas coletas sazonais ao longo do ano, na maioria dos seringais amostrados foram feitas apenas coletas exploratórias pontuais.

Palavras-chave: Ácaros, Biodiversidade, levantamento de fauna, seringueira

Introduction

Two of the most economically important superfamilies of phytophagous mites are Tetranychoidae and Eriophyoidea, which have species represented in rubber trees in Brazil. Baker (1945) registered and described the first mite species, *Tenuipalpus heveae*, from that host. Since then, six other species were described from rubber trees in that country: *Calacarus heveae* Feres (1992), *Phyllocopturata seringueirae* Feres (1998), *Shevtchenkella petiolula* Feres (1998), *Zetzellia agistzellia* Hernandez & Feres (2005), *Z. quasagistemas* Hernandez & Feres (2005) and *Tetrabdella neotropica* Hernandez & Feres (2006a). *Calacarus heveae*, considered an important pest of rubber trees, responsible for serious attacks, reaches high populations on the upper side of the leaves from February to April in the northwestern region of the State of São Paulo leading to premature fall of the leaves (Feres 1992, 2000, 2001, Feres *et al.* 2002, Vieira & Gomes 1999, Vieira *et al.* 2000).

The first paper reporting mites of rubber trees (*Hevea brasiliensis* Muell.Arg., Euphorbiaceae) listed 8 acarine species (Chiavegato 1968). The study of mites associated with that plant was triggered after the discovery of *C. heveae* (Figure 1), after what several works arose in order to understand the diversity and the seasonal occurrence of mites on that crop (Bellini *et al.* 2005a, Feres 2000, 2001a, 2001b, Feres & Nunes 2001, Feres *et al.* 2002, Zacarias & Moraes 2001, 2002, Ferla & Moraes 2002a, Hernandez & Feres 2006b), their biology (Ferla & Moraes 2003a, Pontier *et al.* 2000, Hernandez *et al.* 2006), taxonomy (Feres 1998, Hernandez & Feres 2005, Pontier & Flechtmann 1999, 2000), chemical control (Vieira & Gomes 2001), and influence of associated vegetation (Feres & Nunes 2001, Bellini *et al.* 2005b, Demite & Feres 2005). Tanzini *et al.* (1999) and Bellini *et al.* (2005a) registered epizooty of the fungus *Hirsutella thompsoni* on *C. heveae*. The aim of this work was to summarize the knowledge of mites found on rubber trees in Brazil, giving a panorama of the development of this field and pointing the main species that occur on that plant.

Material and Methods

In this paper we review the literature concerning the mite fauna registered on rubber trees in Brazil (*Hevea* spp., Euphorbiaceae), and also include data from exploratory samplings in Goianésia, State of Goiás, (15° 10' 19''S, 48° 57' 11''W) and from a triennial survey with monthly samplings conducted from January 2001 to December 2003 in Cedral (Hernandez & Feres 2006b), northwestern region of the State of São Paulo (20° 55' 30''S, 49° 26' 79''W). Once the material studied by Feres (2000) from Itiquira, State of Mato Grosso, was wrongly referred in that article as collected in Rondonópolis, State of Mato Grosso (R.J.F. Feres, pers. comm.), the correct location is adopted in the present article.

The nomenclature of the higher taxa follows Woolley (1988), and information concerning the Museum or Institution in which most of the type specimens are deposited is given according to the legends: BMNH - British Museum (Natural History), London, UK; CNC - Canadian National Collection, Toronto, Ontario, Canada; DZSJRP - Coleção de Acari do Departamento de Zoologia e Botânica, UNESP, S.J. do Rio Preto, São Paulo, Brazil; ESALQ - Collection of Departamento de Entomologia, Fitopatologia e Zoologia Agrícola, Universidade de São Paulo/ESALQ, Piracicaba, São Paulo, Brazil; FSCA - Florida State Collection of Arthropods, Gainesville, Florida, USA; IRSN - L'Institut Royal des Sciences Naturelles, Belgium; LE - Laboratorium voor Entomologie, Landbouwhoogeschool to Wageningen, Netherlands; MCZ - Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, USA; NCAPPRI - National Collection of Acari Plant Protection Research Institute, Pretoria, South Africa; UC - University of California, USA; USNM - United States National Museum, Washington DC, USA.

Results and Discussion

GAMASIDA

Phytoseiidae Berlese, 1916

Amblyseius acalyphus Denmark & Muma, 1973

Amblyseius acalyphus Denmark & Muma, 1973: 243; 1989: 75; Moraes *et al.*, 1986: 6; Feres & Moraes, 1998: 125.

Registers on *Hevea*: Mato Grosso: Itiquira, Pontes e Lacerda (Ferla & Moraes 2002a), on *H. brasiliensis*.

Types: on *Acalypha* sp. (Euphorbiaceae), Rio Claro, São Paulo, Brazil, deposited in ESALQ.

Amblyseius compositus Denmark & Muma, 1973

Amblyseius compositus Denmark & Muma, 1973: 240, 1989:9; Moraes & McMurtry, 1983: 134.

Registers on *Hevea*: São Paulo: Piracicaba (Vis *et al.* 2006), on *H. brasiliensis*.

Types: on *Spathodea* sp. (Bignoniaceae), Sao Paulo, Brazil, deposited in ESALQ.

Amblyseius impeltatus Denmark & Muma, 1973

Amblyseius impeltatus Denmark & Muma, 1973: 241.

Registers on *Hevea*: São Paulo: Pariquera-Açu (Zacarias & Moraes 2001, 2002), on *H. brasiliensis*.

Types: on *Theobroma* sp. (Sterculiaceae), Pariquera-Açu, São Paulo, Brazil, deposited in ESALQ.

***Amblyseius neochiapensis* Lofego, Moraes & McMurtry, 2000**

Amblyseius neochiapensis Lofego, Moraes & McMurtry, 1999 (2000): 462.

Registers on *Hevea*: Mato Grosso: Itiquira, Pontes e Lacerda (Ferla & Moraes 2002a), on *H. brasiliensis*.

Types: on *Manihot* sp. (Euphorbiaceae), Piritiba, Bahia, Brazil, deposited in ESALQ.

***Amblyseius operculatus* DeLeon, 1967**

Amblyseius operculatus DeLeon, 1967: 26; Denmark & Muma, 1989: 47.

Registers on *Hevea*: São Paulo: Pariquera-Açu (Zacarias & Moraes 2001, 2002), on *H. brasiliensis*.

Types: on *Cephaelis* sp. (Rubiaceae), half way to Simla and Arima, Trinidad, deposited in MCZ.

***Amblyseius (Amblyseius) saopaulus* Denmark & Muma, 1973**

Amblyseius saopaulus Denmark & Muma, 1973: 243.

Amblyseius (Amblyseius) saopaulus; Denmark & Muma, 1989: 32.

Registers on *Hevea*: São Paulo: Pariquera-Açu (Zacarias & Moraes 2001, 2002), on *H. brasiliensis*.

Types: on *Theobroma* sp. (Sterculiaceae), Pariquera-Açu, São Paulo, Brazil, deposited in ESALQ.

***Euseius alatus* DeLeon, 1966**

Euseius alatus DeLeon, 1966: 87.

Euseius paraguayensis; Denmark & Muma, 1970: 224 (synonym according to Moraes & McMurtry, 1983: 137).

Euseius alatus; Denmark & Muma, 1973: 262; Moraes & McMurtry, 1983: 137; Feres & Moraes, 1998: 127.

Registers on *Hevea*: São Paulo: Piracicaba (Zacarias & Moraes 2001, 2002); Mato Grosso: Itiquira, Pontes e Lacerda (Ferla & Moraes 2002a), on *H. brasiliensis*.

Types: on *Cassia bicapsularis* L. (Fabaceae), Georgetown, East Demeraka, Guiana, deposited in collection of D. DeLeon, Erwin, Tennessee, USA.

Remarks: possibly predator of *Phyllocoptruta oleivora* (Ashmead), a citrus pest (Reis *et al.* 2000).

***Euseius citrifolius* Denmark & Muma, 1970**

Euseius citrifolius Denmark & Muma, 1970: 222; Moraes & McMurtry, 1983: 138; Moraes *et al.*, 1991: 131; Feres & Moraes, 1998: 125; Feres, 2000: 161.

Registers on *Hevea*: São Paulo: Cedral (Feres *et al.* 2002, Hernandez & Feres 2006b), Pindorama, Taquaritinga (Feres *et al.* 2002), Piracicaba (Zacarias & Moraes 2001, 2002, Vis *et al.* 2006), Olímpia (Bellini *et al.* 2005a), São José do Rio Preto (Demite & Feres 2005), Ibitinga, Macaubal, Barretos;

Minas Gerais: Frutal (Feres 2000); Mato Grosso: Itiquira (Feres 2000, Ferla & Moraes 2002a), on *H. brasiliensis*.

Types: on *Citrus* sp. (Rutaceae), Asunción, Departamento Central, Paraguai, deposited in FSCA.

Remarks: this is the most frequent and numerous phytoseiid found in rubber trees in the northeastern State of São Paulo (Feres & Moraes 1998), collected on several host plants.

***Euseius concordis* (Chant, 1959)**

Typhlodromus (Amblyseius) concordis Chant, 1959: 69.

Amblyseius (Iphiseius) concordis; Muma, 1961: 288.

Amblyseius concordis; Chant & Baker, 1965: 22; Moraes & McMurtry, 1983: 138.

Euseius flechtmanni; Denmark & Muma, 1970: 223; Denmark & Muma, 1973: 261 (synonym according to Moraes *et al.*, 1982: 18).

Euseius concordis; Denmark & Muma, 1973: 264; Moraes & Oliveira, 1982: 317; Moraes & McMurtry, 1983: 138; Feres & Moraes, 1998: 127; Feres 2000: 161.

Registers on *Hevea*: São Paulo: Cedral (Feres *et al.* 2002, Hernandez & Feres 2006b), Taquaritinga (Feres *et al.* 2002); Mato Grosso: Itiquira (Feres 2000, Ferla & Moraes 2002a), Pontes e Lacerda (Ferla & Moraes 2002a), on *H. brasiliensis*.

Types: on *Citrus* sp. (Rutaceae), Concordia, Entre Rios, Argentina, deposited in USNM.

Remarks: mites of this genus are the most common predatory mites in untreated apple orchards in the State of Rio Grande do Sul, Brazil (Ferla & Moraes 2002b); the most numerous phytoseiid found in rubber trees in southern State of Mato Grosso (Ferla & Moraes 2002a).

***Galendromimus (Galendromimus) alveolaris* (DeLeon, 1957)**

Typhlodromus alveolaris DeLeon, 1957: 141.

Typhlodromus (Typhlodromus) alveolaris; Chant, 1959: 52.

Cydnodromella alveolaris; Chant & Yoshida-Shaul, 1986: 2821; Moraes & Mesa, 1988: 80.

Galendromimus alveolaris; DeLeon, 1962: 175; DeLeon, 1967: 13; Muma, 1961: 298; Muma *et al.*, 1970: 58.

Galendromimus (Galendromimus) alveolaris; Moraes *et al.*, 1999 (2000): 255.

Registers on *Hevea*: Mato Grosso: Pontes e Lacerda (Ferla & Moraes 2002a), on *H. brasiliensis*.

Types: on *Cassia* sp. (Fabaceae), Coral Gables, Dade, Florida, USA, deposited in MCZ.

Remarks: abundant in *Mabea fistulifera* Mart. (Euphorbiaceae) in northeastern State of São Paulo (Daud & Feres 2005).

***Galendromus (Galendromus) annectens* (DeLeon, 1958)**

Typhlodromus annectens DeLeon, 1958: 75; Chant & Yoshida-Saul, 1984: 1868; Moraes & McMurtry, 1983: 142; Moraes & Mesa, 1988: 82; Moraes *et al.*, 1991: 134; Feres & Moraes, 1998: 128; Feres, 2000: 161; Feres & Nunes, 2001: 1256.

Galendromus annectens; Muma, 1961: 298; Muma, 1963: 20; Muma *et al.*, 1970: 135; Denmark & Muma, 1973: 274; Farias *et al.*, 1981: 21; Denmark, 1982: 142; Moraes *et al.*, 1982: 21; Moraes *et al.*, 1986: 186; Gondim Jr. & Moraes, 2001: 88.

Galendromus (Galendromus) annectens; Moraes *et al.*, 2004: 265.

Registers on *Hevea*: Mato Grosso: Itiquira (Feres 2000, Ferla & Moraes 2002a), Pontes e Lacerda (Ferla & Moraes 2002a); São Paulo: Olímpia (Bellini *et al.* 2005a), Cedral (Hernandes & Feres 2006b), on *H. brasiliensis*.

Types: on *Trema floridana* Britton ex Small (Ulmaceae), Coral Gables, Dade, Florida, USA, deposited in MCZ.

***Galendromus* sp.**

Registers on *Hevea*: Mato Grosso: Pontes e Lacerda (Ferla & Moraes 2002a), on *H. brasiliensis*.

***Iphiseiodes zuluagai* Denmark & Muma, 1972**

Iphiseiodes zuluagai Denmark & Muma, 1972: 23.

Amblyseius zuluagai; Moraes & Mesa, 1988: 79; Moraes *et al.*, 1991: 125.

Iphiseiodes zuluagai; Aponte & McMurtry, 1995: 165; Kreiter & Moraes, 1997: 377; Feres & Moraes, 1998: 127.

Registers on *Hevea*: São Paulo: Piracicaba (Zacarias & Moraes 2001, 2002), Taquaritinga (Feres *et al.* 2002), on *H. brasiliensis*.

Types: on *Citrus sinensis* (L.) Osbeck (Rutaceae), Palmira, Valle, Colombia, deposited in FSCA.

Remarks: in Taquaritinga, São Paulo, it was collected in a crop neighbor to *Citrus* sp., where it was also present, probably moving from these cultures (Feres *et al.* 2002).

***Iphiseiodes* sp.**

Registers on *Hevea*: São Paulo: Rio Claro (Flechtmann & Arleu 1984), on *H. brasiliensis*.

***Metaseiulus camelliae* (Chant & Yoshida-Shaul, 1983)**

Typhlodromus camelliae Chant & Yoshida-Shaul, 1983: 1053; Feres & Moraes, 1998: 130.

Typhlodromina camelliae; Moraes *et al.*, 1986: 236; Sato *et al.*, 1994: 437; Zacarias & Moraes, 2001: 583.

Metaseiulus camelliae; Moraes *et al.* 2004: 278.

Registers on *Hevea*: São Paulo: Olímpia (Bellini *et al.* 2005a), Piracicaba (Zacarias & Moraes 2002, Vis *et al.* 2006), Cedral (Hernandes & Feres 2006b), on *H. brasiliensis*.

Types: on *Camellia* sp. (Theaceae), Uruguai, intercepted in Miami, Florida, USA, deposited in CNC.

***Neoseiulus anonymus* (Chant & Baker, 1965)**

Amblyseius anonymus Chant & Baker, 1965: 21; Schicha & Elshafie, 1980: 32; McMurtry, 1983: 254.

Neoseiulus anonymus; Denmark & Muma, 1973: 27; Moraes & Mesa, 1988: 76; Moraes *et al.*, 1991: 126; Kreiter & Moraes, 1997: 378; Moraes *et al.*, 1999 (2000): 245.

Registers on *Hevea*: Mato Grosso: Itiquira, Pontes e Lacerda (Ferla & Moraes 2002a), on *H. brasiliensis*.

Types: on banana (*Musa paradisiaca* L., Musaceae), Tacamiche, La Lima, Honduras, deposited in USNM.

Remarks: one of the species commonly associated with *Mononychellus tanajoa* (Bondar) (Tetranychidae) in North-eastern Brazil (Moraes *et al.* 1988).

***Neoseiulus idaeus* Denmark & Muma, 1973**

Neoseiulus idaeus Denmark & Muma, 1973: 266.

Amblyseius idaeus; Moraes & McMurtry, 1983: 134.

Registers on *Hevea*: São Paulo: Cedral (Hernandes & Feres 2006b), on *H. brasiliensis*.

Types: on *Rubus idaeus* L. (Rosaceae), Piracicaba, São Paulo, Brazil, deposited in ESALQ.

***Neoseiulus tunus* (DeLeon, 1967)**

Typhlodromips tunus DeLeon, 1967: 29; Denmark & Muma, 1973: 253; Moraes *et al.*, 1986: 151.

Amblyseius tunus; McMurtry & Moraes, 1989: 181; Feres & Moraes, 1998: 126.

Neoseiulus tunus; Ferla & Moraes, 2002a: 872; Moraes *et al.*, 2004: 148.

Registers on *Hevea*: Mato Grosso: Pontes e Lacerda (Ferla & Moraes 2002a), on *H. brasiliensis*.

Types: on guava (*Psidium guajava* L., Mirtaceae), Upper Saint John's Road, Tunapuna, Trinidad, deposited in MCZ.

***Phytoscutus sexpilis* Muma, 1961**

Phytoscutus sexpilis Muma, 1961: 275; DeLeon, 1967: 17.

Typhlodromus sexpilis; Hirschmann, 1962: 17.

Amblyseius sexpilis; van der Merwe, 1968: 161.

Phytoscutus sexpilis; Muma *et al.*, 1970: 24; Yoshida-Shaul & Chant, 1997: 234.

Registers on *Hevea*: São Paulo: Olímpia (Bellini *et al.* 2005a), Pariquera-Açu (Zacarias & Moraes 2001, 2002), on *H. brasiliensis*.

Types: on grapefruit (*Citrus paradisi* MacFad., Rutaceae), Polk City, Florida, USA, deposited in USNM.

***Proprioiseiopsis dominigos* (El-Benhawy, 1984)**

Amblyseius dominigos El-Benhawy, 1984: 130; McMurtry & Moraes, 1989: 185; Moraes *et al.*, 1991: 126; Feres & Moraes, 1998: 126.

Proprioiseiopsis dominigos; Gondim Jr. & Moraes, 2001: 81.

Registers on *Hevea*: São Paulo: Pariquera-Açu (Zacarias & Moraes 2001, 2002), on *H. brasiliensis*.

Types: on unidentified plant, Sooretama, Espírito Santo, Brazil, deposited in CNC.

***Proprioiseiopsis ovatus* (Garman, 1958)**

Amblyseius ovatus Garman, 1958: 78.

Amblyseius ovatus, Moraes & McMurtry, 1983: 133; Moraes *et al.*, 1991: 127.

Typhlodromus (*Amblyseius*) *ovatus*, Chant, 1959: 90.

Proprioiseiopsis ovatus, Denmark & Muma, 1973: 237.

Registers on *Hevea*: São Paulo: Piracicaba (Vis *et al.* 2006), on *H. brasiliensis*.

Types: on *Cattleya* sp. (Orchidaceae), from Equador at Brownsville, Texas, deposited in USNM.

***Typhlodromalus feresi* Lofego, Moraes & McMurtry, 2000**

Typhlodromalus feresi Lofego, Moraes & McMurtry, (1999) 2000: 466.

Registers on *Hevea*: Mato Grosso: Pontes e Lacerda (Ferla & Moraes 2002a), on *H. brasiliensis*.

Types: on *Mabea* sp. (Euphorbiaceae) (*M. fistulifera* Mart., R.J.F. Feres, com. pess.), São José do Rio Preto, São Paulo, Brazil, deposited in ESALQ.

Typhlodromalus aff. horatii

Registers on *Hevea*: Mato Grosso: Pontes e Lacerda (Ferla & Moraes 2002a), on *H. brasiliensis*.

***Typhlodromips amilus* DeLeon, 1967**

Typhlodromips amilus DeLeon, 1967: 28.

Registers on *Hevea*: Mato Grosso: Pontes e Lacerda (Ferla & Moraes 2002a), on *H. brasiliensis*.

Types: on Bromeliaceae, Simla, Trinidad, deposited in MCZ.

***Typhlodromips cananeiensis* Gondim Jr. & Moraes, 2001**

Typhlodromips cananeiensis Gondim Jr. & Moraes, 2001: 84.

Registers on *Hevea*: São Paulo: Cananéia (Zacarias & Moraes 2001), Pariquera-Açu (Zacarias & Moraes 2002), on *H. brasiliensis*.

Types: on *Bactris setosa* Mart. (Arecaceae), Cananéia, São Paulo, Brazil, deposited in ESALQ.

Typhlodromips aff. sinensis

Registers on *Hevea*: Mato Grosso: Pontes e Lacerda (Ferla & Moraes 2002a), on *H. brasiliensis*.

***Typhlodromus* (*Anthoseius*) *transvaalensis* (Nesbitt, 1951)**

Kampimodromus transvaalensis Nesbitt, 1951: 55.

Typhlodromus transvaalensis; Chant, 1955: 498.

Typhlodromus jackmickleyi; DeLeon, 1958: 175.

Typhlodromus pectinatus; Athias-Henriot, 1958: 179.

Neoseiulus transvaalensis; Muma, 1961: 295.

Clavidromus jackmickleyi; Muma, 1961: 296.

Clavidromus transvaalensis; Muma & Denmark, 1968: 238.

Typhlodromus (*Anthoseius*) *transvaalensis*; Chant & McMurtry, 1994: 252.

Registers on *Hevea*: Mato Grosso: Pontes e Lacerda (Ferla & Moraes 2002a), on *H. brasiliensis*.

Types: on peanut (*Arachis hypogaea* L., Fabaceae), Nylstroom, Transvaal, South Africa, deposited in CNC.

ACTINEDIDA

Acarophenacidae Cross, 1965

Unidentified sp.

Registers on *Hevea*: São Paulo: São Jose do Rio Preto (Demite & Feres 2005) on *H. brasiliensis*.

Remarks: parasites on insects; casual record on rubber trees.

Bdellidae Dugès, 1834

***Tetrabdella neotropica* Hernandez & Feres, 2006a:57**

Tetrabdella neotropica Hernandez & Feres, 2006a:57

Registers on *Hevea*: São Paulo: Cedral (Feres *et al.* 2002, Hernandez & Feres 2006b), Pindorama (Feres *et al.* 2002), Olímpia (Bellini *et al.* 2005a), Piracicaba (Vis *et al.* 2006), São Jose do Rio Preto (Demite & Feres 2005), on *H. brasiliensis*.

Remarks: Previously referred as *Spinibdella* sp. (Feres *et al.* 2002, Bellini *et al.* 2005a), and aff. *Spinibdella* (Demite & Feres 2005, Vis *et al.* 2006), this genus bears only two pairs of trichobothriae, on tarsi III and IV (Hernandes & Feres 2005b). As in *Spinibdella cronini* Baker & Balock it spins a silken cocoon around each egg (Wallace & Mahon 1972); in rubber trees it occurs mostly at the base of the leaflets, where it spins a silken cocoon, inside which it moults.

Cheyletidae Leach, 1815

Cheletomimus (Hemicheyletia) wellsi (Baker, 1949a)

Cheyletia wellsi Baker, 1949a: 300-301.

Paracheyletia wellsi; Volgin, 1955: 152; Muma, 1964: 245-246.

Dendrocheyletia wellsi; Volgin, 1969: 211.

Hemicheyletia wellsi; Summers & Price, 1970: 18.

Cheletomimus (Hemicheyletia) wellsi; Fain *et al.* 2002: 45; Feres 2000: 162.

Registers on *Hevea*: São Paulo: Reginópolis (Feres 2000), Taquaritinga (Feres *et al.* 2002), Cedral (Hernandes & Feres 2006b), on *H. brasiliensis*.

Types: on *Citrus* sp. (Rutaceae), Philadelphia, USA, deposited in USNM.

Remarks: this predator is commonly found in leaves and fruits of *Citrus* attacked by *Phyllocoptruta oleivora* (Ashmead) (Chiavegato 1980).

***Cheletogenes* sp.**

Registers on *Hevea*: São Paulo: Olímpia (Bellini *et al.* 2005a); Goiás: Goianésia, on *H. brasiliensis*.

***Cheyletia* sp.**

Registers on *Hevea*: São Paulo: Olímpia (Bellini *et al.* 2005a); Goiás: Goianésia, on *H. brasiliensis*.

***Hemicheyletia* sp.**

Registers on *Hevea*: Pariqueira-Açu (Zacarias & Moraes 2002), on *H. brasiliensis*.

Cunaxidae Thor, 1902

***Pulaeus* sp.**

Registers on *Hevea*: São Paulo: Pariqueira-Açu (Zacarias & Moraes 2002), on *H. brasiliensis*.

***Pseudobonzia* sp.**

Registers on *Hevea*: Mato Grosso: Itiquira (Feres 2000, Ferla & Moraes 2002a), Pontes e Lacerda (Ferla & Moraes 2002a); São Paulo: Cedral, on *H. brasiliensis*.

***Scutopalus* sp.**

Pariqueira-Açu (Zacarias & Moraes 2002), on *H. brasiliensis*.

Eriophyidae Nalepa, 1898

aff. *Acaphyllisa* sp.

Registers on *Hevea*: Mato Grosso: Itiquira (Ferla & Moraes 2002a), on *H. brasiliensis*.

Remarks: probably casual record on rubber trees; only one specimen was collected.
<http://www.biotaneotropica.org.br>

***Calacarus heveae* Feres, 1992**

Calacarus heveae Feres, 1992: 61; 2000: 167; 2001: 343.

Registers on *Hevea*: Amazonas: Manaus (Feres 2001a); São Paulo: Cedral (Feres *et al.* 2002, Hernandez & Feres 2006b), Pindorama, Taquaritinga (Feres *et al.* 2002), Olímpia (Bellini *et al.* 2005a), Pariqueira-Açu (Zacarias & Moraes 2002), Piracicaba (Zacarias & Moraes 2002, Vis *et al.* 2006), São José do Rio Preto (Demite & Feres 2005), Américo de Campos, Barretos, José Bonifácio, Pindorama, Planalto, Macaubal, Monte Aprazível, Reginópolis; Minas Gerais: Frutal (Feres 2000); Mato Grosso: Itiquira (Feres 2000, Ferla & Moraes 2002a), Pontes e Lacerda (Ferla & Moraes 2002a); Mato Grosso do Sul: Selvíria (Feres 2000), Goiás: Goianésia, on *H. brasiliensis*.

Types: on *H. brasiliensis* (Euphorbiaceae), Planalto, São Paulo, Brazil, deposited in DZSJRP.

Remarks: serious pest of rubber trees in Brazil, this species reaches large populations on the upper side of the leaves from January to April; it leads to premature fall of leaves, preceding the natural senescence, bringing on extra budding (Feres 1992, 2000, 2001, Vieira & Gomes 1999).

aff. *Chakrabartiella* sp.

Registers on *Hevea*: Mato Grosso: Pontes e Lacerda (Ferla & Moraes 2002a), on *H. brasiliensis*.

Remarks: probably casual record on rubber trees, only four individuals were collected.

***Phyllocoptruta seringueirae* Feres, 1998**

Phyllocoptruta seringueirae Feres, 1998: 71; 2000: 168; 2001: 343.

Registers on *Hevea*: Amazonas: Manaus (Feres 2001a); São Paulo: Cedral (Feres *et al.* 2002, Hernandez & Feres 2006b), Pindorama (Feres *et al.* 2002), Olímpia (Bellini *et al.* 2005a), Buritama, Monte Aprazível, Reginópolis (Feres 2000), São José do Rio Preto (Demite & Feres 2005); Mato Grosso: Itiquira (Feres 2000, Ferla & Moraes 2002a), Pontes e Lacerda (Ferla & Moraes 2002a); Goiás: Goianésia, on *H. brasiliensis*.

Types: on *H. brasiliensis* Muell. Arg. (Euphorbiaceae), Reginópolis, São Paulo, Brazil, deposited in DZSJRP.

Remarks: registered in great abundance in rubber tree crops of Itiquira, Mato Grosso (Ferla & Moraes 2002a, R.J.F. Feres, pers. comm.).

***Shevtchenkella petiolula* Feres, 1998**

Shevtchenkella petiolula Feres, 1998: 69; 2000: 168; 2001: 343.

Registers on *Hevea*: Amazonas: Manaus (Feres 2001a); São Paulo: Cedral (Feres *et al.* 2002, Hernandez & Feres 2006b), Pindorama (Feres *et al.* 2002), Olímpia (Bellini *et al.* 2005a), Piracicaba (Vis *et al.* 2006), Buritama, Reginópolis (Feres

2000), São José do Rio Preto (Demite & Feres 2005); Mato Grosso: Itiquira (Feres 2000, Ferla & Moraes 2002a), Pontes e Lacerda (Ferla & Moraes 2002a); Mato Grosso do Sul: Selvíria (Feres 2000), on *H. brasiliensis*.

Types: on *H. brasiliensis* Muell. Arg. (Euphorbiaceae), Buritama, São Paulo, Brazil, deposited in DZSJRP.

Remarks: this species is mostly found on petioles, petiolules and flowers of rubber trees, in small number, from September to November (Feres 2000).

Eupalopsellidae Willmann, 1952

***Exothorhis caudata* Summers, 1960**

Exothorhis caudata Summers, 1960: 131; Rakha & McCoy, 1985: 142.

Exothorhis citri, Meyer & Ueckermann, 1989: 10.

Exothorhis caudata, Rimando & Corpuz-Raros, 1996: 110; Swift, 1997: 39.

Registers on *Hevea*: São Paulo: Piracicaba (Vis *et al.* 2006), on *H. brasiliensis*.

Types: on *Citrus* sp. (Rutaceae), Florida, USA, deposited in UC, USA.

Remarks: Matioli *et al.* (2002) suggested this species reproduce by parthenogenesis, because no males have been registered to date. It was found associated with some citrus scale insects (*Parlatoria cinerea*, *Coccus viridis*, *Saissetia coffeae*, *Selenaspidus articulatus*, *Orthezia praelonga* and *Pinnaspis aspidistrae*)

Stigmaeidae Oudemans, 1931

Agistemus floridanus Gonzalez-Rodriguez, 1965

Agistemus floridanus Gonzalez-Rodriguez, 1965: 38; Matioli *et al.*, 2002: 103; Arruda Filho & Moraes, 2003: 52.

Registers on *Hevea*: Mato Grosso: Itiquira, Pontes e Lacerda (Ferla & Moraes 2002a); São Paulo: Olímpia (Bellini *et al.* 2005a) on *H. brasiliensis*.

Types: on *Ligustrum* sp. (Oleaceae), Orlando, Florida, USA, deposited in USNM.

Remarks: this species showed high oviposition rate when fed on *C. heveae* and *T. heveae*, serious pests of rubber trees in Brazil (Ferla & Moraes 2003a); along with Phytoseiidae, mites of this family are the most commonly found predators in rubber trees of Southeast and Middle West Brazil (Feres 2000, Ferla & Moraes 2002a).

Agistemus aff. floridanus

Registers on *Hevea*: Cedral (Hernandes & Feres 2006b).

Remarks: as mentioned by Buosi *et al.* (2006), there is a large range in several body measurements of this species, comprising the values reported by Matioli *et al.* (2002) for

A. brasiliensis Matioli *et al.* (2002) and *A. floridanus* Gonzalez (1965). In that respect, it was not possible to determine the real status of that species.

***Agistemus* sp.**

Registers on *Hevea*: São Paulo: Ibitinga, Barretos (Feres 2000), Cedral, Pindorama (Feres *et al.* 2002), Pariquera-Açu (Zacarias & Moraes 2002), Piracicaba (Zacarias & Moraes 2002, Vis *et al.* 2006); Mato Grosso: Itiquira (Feres 2000); Goiás: Goianésia, on *H. brasiliensis*; Barretos (Feres 2000) on *H. pauciflora* e *H. benthamiana*.

Remarks: species of this genus are often cited as predators of tetranychid eggs (McMurtry *et al.* 1970, Oomen 1982, Inoue & Tanaka 1983 *apud* Ehara 1993) and of species of *Tenuipalpus* (Flechtmann 1975); occurs in a large variety of plants. Probably some registers of *Agistemus* males are from males of *Zetzellia agistzellia*.

***Eryngiopus* sp.**

Registers on *Hevea*: São Paulo: Piracicaba (Vis *et al.* 2006), on *H. brasiliensis*.

***Eustigmaeus* sp.**

Registers on *Hevea*: São Paulo: Piracicaba (Zacarias & Moraes 2002), on *H. brasiliensis*.

Remarks: referred as *Ledermuelleria* sp., synonym by Wood (1973:182).

***Mediolata* sp.**

Registers on *Hevea*: São Paulo: Piracicaba (Vis *et al.* 2006), on *H. brasiliensis*.

Zetzellia malvinae **Matioli, Ueckermann & Oliveira, 2002**
Zetzellia malvinae Matioli, Ueckermann & Oliveira, 2002: 111.

Registers on *Hevea*: São Paulo: Piracicaba (Vis *et al.* 2006), on *H. brasiliensis*.

Types: on *Citrus sinensis* (Rutaceae), Limeira, Sao Paulo, Brazil, deposited in ESALQ.

***Zetzellia mapuchina* Gonzalez-Rodriguez, 1965**

Zetzellia mapuchina Gonzalez-Rodriguez, 1965: 23.

Registers on *Hevea*: São Paulo: Cedral (Hernandes & Feres 2006b), on *H. brasiliensis*.

Types: on *Citrus reticulata* (Rutaceae), Argentina, intercepted in Miami, Florida, USA, deposited in USNM.

***Zetzellia agistzellia* Hernandez & Feres, 2005**

Zetzellia agistzellia Hernandez & Feres, 2005: 28.

Registers on *Hevea*: São Paulo: Cedral (Hernandes & Feres 2006b), on *H. brasiliensis*.

Remarks: This species present sexes with different patterns of organization of dorsal platelets: males resemble *Agistemus* whereas females resemble *Zetzellia*.

***Zetzellia quasagistemus* Hernandez & Feres, 2005**

Zetzellia quasagistemus Hernandez & Feres, 2005: 37.

Registers on *Hevea*: Mato Grosso: Itiquira, Pontes e Lacerda (Ferla & Moraes 2002a); São Paulo: Ibitinga, Reginópolis (Feres 2000), Olímpia (Bellini *et al.* 2005a), Pindorama (Feres *et al.* 2002), São José do Rio Preto (Demite & Feres 2005), Cedral (Feres *et al.* 2002, Hernandez & Feres 2006b); Goiás: Goianésia, on *H. brasiliensis*.

Remarks: Previously referred as *Zetzellia* sp. (Bellini *et al.* 2005a) and *Z. aff. yusti* (Ferla & Moraes 2002a), this species present, as *Z. agistzellia*, some characters commonly found in males of *Agistemus*: males with setae *fl* inserted on the main plate and setae *e1* greatly reduced.

Tarsonemidae Canestrini & Fanzago, 1877

***Daidalotarsonemus* spp.**

Registers on *Hevea*: Mato Grosso: Itiquira (Feres 2000); São Paulo: Piracicaba (Vis *et al.* 2006), on *H. brasiliensis*.

***Fungitarsonemus* sp.**

Registers on *Hevea*: São Paulo: Pindorama (Feres *et al.* 2002), Olímpia (Bellini *et al.* 2005a), Cedral (Hernandes & Feres 2006b), on *H. brasiliensis*.

***Polyphagotarsonemus latus* (Banks, 1904)**

Tarsonemus latus Banks, 1904: 1553.

Hemitarsonemus latus; Ewing, 1939: 54.

Neotarsonemus latus; Smiley, 1967: 137.

Polyphagotarsonemus latus; Beer & Nucifora, 1965: 38; Feres 2000: 164.

Registers on *Hevea*: Minas Gerais: Frutal (Feres 2000); São Paulo: Pindorama (Feres *et al.* 2002), Campinas (Chiavegato 1968); Mato Grosso: Itiquira, Pontes e Lacerda (Ferla & Moraes 2002a), on *H. brasiliensis*.

Types: on mango (*Mangifera* sp., Anacardiaceae), Washington DC, USA., in greenhouse, deposited at MCZ.

Remarks: cosmopolitan pest of several crops; in Campinas, it was collected in clones of rubber trees (Chiavegato 1968).

***Tarsonemus confusus* Ewing, 1939**

Tarsonemus confusus Ewing, 1939: 26; Smiley, 1969: 221; Kaliszewski, 1993: 40.

Registers on *Hevea*: São Paulo: Olímpia (Bellini *et al.* 2005a), on *H. brasiliensis*.

Types: on *Delphinium belladonna*, (Ranunculaceae), Suitland, MD, USA, deposited in USNM.

Remarks: this species has been found in both thelytokous and sexual populations (Lindquist 1986 *apud* Wrensch & Ebbert 1993).

***Tarsonemus* spp.**

Registers on *Hevea*: Mato Grosso: Itiquira (Feres 2000, Ferla & Moraes 2002a), Pontes e Lacerda (Ferla & Moraes 2002a); São Paulo: Cedral (Feres *et al.* 2002, Hernandez & Feres 2006b), Pindorama (Feres *et al.* 2002), Piracicaba (Vis *et al.* 2006), São José do Rio Preto (Demite & Feres 2005), Pariquera-Açu (Zacarias & Moraes 2002), on *H. brasiliensis*.

Remarks: it may be more than one species, for the material from Pontes e Lacerda was not examined; mites of this genus are usually cosmopolitans and primarily mycophagous.

***Xenotarsonemus* sp.**

Registers on *Hevea*: São Paulo: Pariquera-Açu (Zacarias & Moraes 2002), on *Hevea brasiliensis*.

Tenuipalpidae Berlese, 1913

***Brevipalpus phoenicis* (Geijskes, 1939)**

Tenuipalpus phoenicis Geijskes, 1939: 23.

Brevipalpus phoenicis; Sayed, 1946a: 99.

Brevipalpus yothersi; Baker, 1949b: 374.

Brevipalpus mcbridei; Baker, 1949b: 374.

Brevipalpus papayensis; Baker, 1949b: 379.

Brevipalpus phoenicis; Pritchard & Baker, 1958: 233; DeLeon, 1961: 48; Gonzalez, 1975: 82; Baker *et al.*, 1975: 18; Meyer, 1979: 87; Baker & Tuttle, 1987: 98-99; Feres 2000: 164.

Registers on *Hevea*: São Paulo: Cedral (Feres 2000, Hernandez & Feres 2006b), Ibitinga, José Bonifácio, Macaubal, Reginópolis (Feres 2000), Pindorama (Feres *et al.* 2002), Piracicaba (Vis *et al.* 2006), Rio Claro; Bahia: Itabuna (Flechtmann & Abreu 1973; Flechtmann & Arleu 1984); Mato Grosso: Itiquira, Pontes e Lacerda (Ferla & Moraes 2002a), on *H. brasiliensis*.

Types: on *Phoenix* sp. (Arecaceae), Netherlands, in greenhouse, deposited in LE.

Remarks: one of the most serious pests of citrus, bearer of leprosis virus; responsible for leaf fall and low quality of coffee (Chagas 1973); cosmopolitan, collected from up to

100 host plants only in Central America (Childers *et al.* 2001).

***Brevipalpus* sp.**

Registers on *Hevea*: São Paulo: Pariquera-Açu (Zacarias & Moraes 2001), on *H. brasiliensis*.

***Tenuipalpus heveae* Baker, 1945**

Tenuipalpus heveae Baker, 1945: 36; Baker & Pritchard, 1953: 320; Feres, 2000: 165.

Registers on *Hevea*: São Paulo: Cedral (Feres *et al.* 2002, Hernandez & Feres 2006b), Pindorama, Taquaritinga (Feres *et al.* 2002); Barretos, Pindorama (Feres 2000), Cedral, Olímpia (Bellini *et al.* 2005a), Piracicaba (Vis *et al.* 2006), São José do Rio Preto (Demite & Feres 2005); Mato Grosso: Itiquira (Feres 2000, Ferla & Moraes 2002a), Pontes e Lacerda (Ferla & Moraes 2002a); Amazonas: Manaus (Flechtmann & Arleu 1984); Pará: Belém (Flechtmann 1979); Goiás: Goianésia, on *H. brasiliensis*; Itiquira, on *H. viridis* (Feres 2000), on *H. viridis*.

Types: on *H. brasiliensis* (Euphorbiaceae), Belterra, Pará, Brazil, deposited in USNM.

Remarks: registered in large populations mostly on the lower side of the leaves (Feres 2000, Feres *et al.* 2002, Ferla & Moraes 2002a); but also found on the upper side when in high infestation; in December 2000, it led to bronzing and severe fall of the leaves in crops from Goianésia, Goiás (J.F.C. Benesi, pers. comm.).

Tetranychidae Donnadieu, 1875

***Allonychus braziliensis* (McGregor, 1950)**

Septanychus braziliensis McGregor, 1950: 318.

Allonychus braziliensis; Pritchard & Baker, 1955: 137.

Registers on *Hevea*: São Paulo: Campinas (Chiavegato 1968), on *H. brasiliensis*.

Types: on quince (*Cydonia* sp., Rosaceae), Viçosa, Minas Gerais, Brazil, deposited in USNM.

Remarks: possibly casual record, on clones of rubber trees (Chiavegato 1968).

***Atrichoproctus uncinatus* Flechtmann, 1967**

Atrichoproctus uncinatus Flechtmann, 1967: 39 *apud* Flechtmann & Baker, 1970: 157; Flechtmann & Baker, 1975: 116; Feres, 2000: 166.

Registers on *Hevea*: Mato Grosso: Itiquira, on *H. benthamiana* (Feres 2000).

Types: on *Rhododendron indicum* (L.) Sweet, (Ericaceae), *Desmodium* sp. (Fabaceae) and *Quercus* sp. (Fagaceae), Piracicaba and Matão, São Paulo, Brazil, deposited in ESALQ.

Remarks: green colored species, occurs mostly on the up-

per side of the leaves.

***Eutetranychus banksi* (McGregor, 1914)**

Tetranychus banksi McGregor, 1914: 358.

Neotetranychus banksi; (McGregor) Banks, 1917: 177.

Anychus banksi; (McGregor) McGregor, 1919: 644.

Eutetranychus banksi; (McGregor) McGregor, 1950: 141.

Tetranychus rusti; McGregor, 1917: 582.

Anychus rusti; (McGregor) McGregor, 1919: 645.

Eutetranychus rusti; (McGregor) McGregor, 1950: 669; synonym according to Pritchard & Baker (1955).

Anychus clarki; McGregor, 1935: 161.

Eutetranychus clarki; (McGregor) McGregor, 1950: 270; synonym according to Pritchard & Baker (1955).

Anychus orientalis; Klein, 1936: 3.

Anychus ? latus; Hirst, 1923: 991.

Anychus latus; Sayed, 1946c: 125.

Anychus africanus; Tucker, 1926: 5.

Anychus verganii; Blanchard, 1940: 24; synonym according to Pritchard & Baker (1955).

Anychus ricini; Rahman & Sapra, 1940: 194.

Eutetranychus mexicanus; McGregor, 1950: 27; synonym according to Pritchard & Baker (1955).

Eutetranychus banksi; McGregor, 1914: 268; Pritchard & Baker, 1955: 115; Flechtmann & Baker, 1970: 156; Flechtmann & Baker, 1975: 112; Feres 2000: 165.

Registers on *Hevea*: São Paulo: Campinas (Chiavegato 1968), Cedral (Feres *et al.* 2002, Hernandez & Feres 2006b), Pindorama, Taquaritinga (Feres *et al.* 2002), Olímpia (Bellini *et al.* 2005a), Pariquera-Açu (Zacarias & Moraes 2002), Piracicaba (Zacarias & Moraes 2002, Vis *et al.* 2006), São José do Rio Preto (Demite & Feres 2005), Bálamo, Ibitinga, Macaubal, Pindorama; Minas Gerais: Frutal (Feres 2000); Mato Grosso: Itiquira (Ferla & Moraes 2002a), on *H. brasiliensis*.

Types: on castor bean (*Ricinus communis* L., Euphorbiaceae) and *Stizolobium* sp. (Fabaceae), Orlando, Florida, USA, deposited in USNM.

Remarks: collected from many hosts all around the world (Bolland *et al.* 1998); pest of citrus in USA.; registered in great abundance in rubber trees in Brazil, although with no evident damage to the leaves; in Campinas, it was collected in yards of clones of rubber trees (Chiavegato 1968).

***Mixonychus* sp.**

Registers on *Hevea*: São Paulo: Piracicaba (Vis *et al.* 2006), on *H. brasiliensis*.

***Mononychellus* sp.**

Registers on *Hevea*: Mato Grosso: Itiquira, Pontes e Lacerda

(Ferla & Moraes 2002a), on *H. brasiliensis*.

***Oligonychus coffeae* (Nietner, 1861)**

Acarus coffeae Nietner, 1861: 19.

Tetranychus bioculatus; Wood-Mason, 1884: 1.

Paratetranychus bioculatus; Baker & Pritchard, 1953: 213.

Oligonychus merwei; Tucker, 1926: 6.

Paratetranychus terminalis; Sayed, 1946b: 94.

Oligonychus coffeae; Pritchard & Baker, 1955: 315; Baker & Pritchard, 1960: 505; Meyer & Rodrigues, 1965: 12; Rodrigues, 1968: 220; Gutierrez, 1968: 446; Meyer, 1974: 251; Meyer, 1987: 146; Feres 2000: 166;

Registers on *Hevea*: Mato Grosso: Itiquira, Pontes e Lacerda (Ferla & Moraes 2002a), on *H. brasiliensis*; Itiquira, on *H. guianensis* and *H. viridis* (Feres 2000).

Types: on *Coffea arabica* L. (Rubiaceae), Sri Lanka (Ceylon), institution of deposition of types not found.

Remarks: considered the most serious pest of tea in several countries (Flechtmann & Arleu 1984); on rubber trees, however, it has not been observed great damages.

***Oligonychus gossypii* (Zacher, 1921)**

Paratetranychus gossypii Zacher, 1921: 183; Hirst, 1926: 832; André, 1933: 306.

Oligonychus gossypii; Pritchard & Baker, 1955: 359; Baker & Pritchard, 1960: 508; Baker & Pritchard, 1962(1963): 327; Flechtmann, 1967: 23, 31; Meyer, 1974: 263; Meyer, 1987: 152; Feres, 2000: 166.

Registers on *Hevea*: São Paulo: Cedral (Feres *et al.* 2002, (Hernandes & Feres 2006b), Ibitinga, Barretos (Feres 2000), Piracicaba (Zacarias & Moraes 2002, *Vis et al.* 2006); Mato Grosso: Itiquira (Feres 2000, Ferla & Moraes 2002a), Pontes e Lacerda (Ferla & Moraes 2002a); Espírito Santo: Viana (Flechtmann & Arleu 1984); Acre: Rio Branco (Flechtmann 1989; Fazolin & Pereira 1989); Amazonas: Manaus (Fazolin & Pereira 1989), on *H. brasiliensis*; Itiquira, Mato Grosso (Feres 2000), on *H. rigidifolia* and *H. viridis*.

Types: on cotton (*Gossypium herbaceum* L., Malvaceae), Togo, Africa, probably deposited in Zacher's collection..

Remarks: registered in great abundance in crops of the States of Pará and Amazonas, leading to intense bronzing and premature fall of the leaves (Fazolin & Pereira 1989, Flechtmann 1989); reported on many plants in West Africa and Central America, as cotton, cassava, bean and papaya (Pritchard & Baker 1955).

***Tetranychus mexicanus* (McGregor, 1950)**

Septanychus mexicanus McGregor, 1950: 323.

Tetranychus mexicanus; Pritchard & Baker, 1955: 411;

Flechtmann, 1967: 21, 29; Chiavegato, 1968: 67; Flechtmann & Baker, 1970: 162; Flechtmann & Baker, 1975: 120; Feres, 2000: 167.

Registers on *Hevea*: Mato Grosso: Itiquira (Feres 2000, Ferla & Moraes 2002a), Pontes e Lacerda (Ferla & Moraes 2002a); São Paulo: Campinas (Chiavegato 1968), on *H. brasiliensis*; Itiquira, on *H. benthamiana* and *H. pauciflora* (Feres 2000).

Types: on *Citrus* (Rutaceae), Mexico, intercepted in Laredo, Texas, USA, deposited in USNM.

Remarks: species of broad geographical distribution, collected from many host plants; in rubber trees it occurs mostly on the lower side of the leaves, where it produces considerable amounts of silk; in Campinas, it was collected in yards of clones of rubber trees (Chiavegato 1968).

***Tetranychus urticae* Koch, 1836**

Tetranychus urticae Koch, 1836: 10.

Acarus telarius Linnaeus; 1758: 616.

Tetranychus telarius (L.); Dugès, 1834: 15; synonymy according to Smith & Baker (1968).

Acarus sambuci Schrank, 1781: 521.

Tetranychus sambuci (Schrank); Koch, 1842: 37.

Epitetranychus sambuci (Schrank); Oudemans, 1931a: 194; synonymy according to Pritchard & Baker (1955).

Tetranychus dugesii; Cano & Alcacio, 1886: 197; synonymy according to Estebanes & Baker (1968).

Acarus textor; Fourcroy, 1785: 530.

Tetranychus textor (Fourcroy); Oudemans, 1929: 276; synonymy according to Pritchard & Baker (1955).

Tetranychus russeolus; Koch, 1838: 15; synonymy according to Pritchard & Baker (1955).

Tetranychus viburni; Koch, 1838: 17.

Schizotetranychus viburni; (Koch) Oudemans, 1937: 1061; synonymy according to Pritchard & Baker (1955).

Tetranychus fervidus; Koch, 1842: 21; synonymy according to Pritchard & Baker (1955).

Acarus cucumeris; Boisduval, 1867: 84.

Tetranychus cucumeris; (Boisduval) Murray, 1877: 102; synonymy according to Pritchard & Baker (1955).

Acarus rosarum; Boisduval, 1867: 84.

Tetranychus rosarum; (Boisduval) Murray, 1877: 102; synonymy according to Pritchard & Baker (1955).

Acarus cinnabarinus; Boisduval, 1867: 88

Tetranychus cinnabarinus; (Boisduval) Boudreaux, 1956; synonymy according to Dupont (1979).

Acarus haematodes; Boisduval, 1867: 88.

Tetranychus telarius haematodes; (Boisduval) Murray, 1877: 101; synonymy according to Smith & Baker (1968).

Acarus ferrugineus; Boisduval, 1867: 90.

Tetranychus ferrugineus; (Boisduval) Murray, 1877: 103; synonymy according to Pritchard & Baker (1955).

Acarus vitis; Boisduval, 1867: 92.

Tetranychus vitis; (Boisduval) Murray, 1877: 103; synonymy according to Pritchard & Baker (1955).

Distigmatus pilosus; Donnadieu, 1875: 118; synonymy according to Pritchard & Baker (1955).

Tetranychus major; Donnadieu, 1875: 120; synonymy according to Pritchard & Baker (1955).

Tetranychus piger; Donnadieu, 1875: 121; synonymy according to Pritchard & Baker (1955).

Tetranychus minor; Donnadieu, 1875: 121; synonymy according to Pritchard & Baker (1955).

Tetranychus longitarsus; Donnadieu, 1875: 122; synonymy according to Pritchard & Baker (1955).

Tetranychus plumistoma; Donnadieu, 1875: 122; synonymy according to Pritchard & Baker (1955).

Tetranychus fici; Murray, 1877: 107; synonymy according to Pritchard & Baker (1955).

Tetranychus eriostemi; Murray, 1877: 109; synonymy according to Pritchard & Baker (1955).

Tetranychus inaequalis; Targioni Tozzetti, 1878: 251; synonymy according to Pritchard & Baker (1955).

Tetranychus bimaculatus; Harvey, 1892: 133; synonymy according to Pritchard & Baker (1955).

Tetranychus altheae; von Hanstein, 1901: 74.

Epitetranychus altheae; (von Hanstein) Zacher, 1916: 23; synonymy according to Pritchard & Baker (1955).

Epitetranychus hamatus; Zacher, 1916: 25; synonymy according to Pritchard & Baker (1955).

Epitetranychus aequans; Zacher, 1916: 25; synonymy according to Pritchard & Baker (1955).

Epitetranychus alcaeae; Oudemans, 1928b: 290; synonymy according to Pritchard & Baker (1955).

Tetranychus reinwardtiae; Oudemans, 1930b: 170;

Epitetranychus reinwardtiae; (Oudemans) Oudemans, 1931a: 194; synonymy according to Pritchard & Baker (1955).

Epitetranychus caldarii; Oudemans, 1931a: 194.

Tetranychus caldarii; (Oudemans) Geijskes, 1939: 40; synonymy according to Pritchard & Baker (1955).

Tetranychus fragariae; Oudemans, 1931a: 226; synonymy according to Pritchard & Baker (1955).

Tetranychus fransseni; Oudemans, 1931b: 227; synonymy according to Pritchard & Baker (1955).

Tetranychus aspidistrae; Oudemans, 1931c: 258; synonymy according to Pritchard & Baker (1955).

Tetranychus choisyae; Oudemans, 1931d: 274; synonymy according to Pritchard & Baker (1955).

Tetranychus stellariae; Oudemans, 1931d: 275; synonymy

according to Pritchard & Baker (1955).

Tetranychus violae; Oudemans, 1931d: 277; synonymy according to Pritchard & Baker (1955).

Tetranychus manihoti; Oudemans, 1931d: 289; synonymy according to Pritchard & Baker (1955).

Eotetranychus inexpectatus; Andre, 1933: 131; synonymy according to Pritchard & Baker (1955).

Tetranychus dahliae; Oudemans, 1937: 1022; synonymy according to Pritchard & Baker (1955).

Eotetranychus scabrisetus; Ugarov & Nikolskii, 1937: 33; synonymy according to Pritchard & Baker (1955).

Eotetranychus cucurbitacearum; Sayed, 1946a: 90; synonymy according to Pritchard & Baker (1955).

Tetranychus multisetis; McGregor, 1950: 294; synonymy according to Pritchard & Baker (1955).

Tetranychus arabicus; Attiah, 1967; synonymy according to Meyer (1987).

Tetranychus aduncus; Flechtmann, 1967: 20; synonymy according to Flechtmann & Baker (1970).

Tetranychus ricinus; Saba, 1973: 63; synonymy according to Meyer (1987).

Registers on *Hevea*: São Paulo: Olímpia (Bellini *et al.* 2005a), on *H. brasiliensis*.

Types: on nettle (*Fleurya aestuans* L., Urticaceae), Regensburg, Germany, type specimens probably lost .

Remarks: this is one of the most serious tetranychid pests; attacks cotton (*Gossypium herbaceum* L.), *Manihot* sp. (Euphorbiaceae) and bean (*Phaseolus vulgaris* L., Fabaceae) (Pritchard & Baker 1955); registered on 912 host plants (Bolland *et al.* 1998); in rubber trees, however, it was found in low number (Bellini *et al.* 2005a).

***Tetranychus* sp.**

Registers on *Hevea*: São Paulo: São Jose do Rio Preto (Demite & Feres 2005), on *H. brasiliensis*.

Remarks: Bolland *et al.* (1998, pg 141) wrongly mentioned *H. brasiliensis* as host for the species *Paraponychus corderoi* (Baker & Pritchard, 1962) (C.H.W. Flechtmann, personal communication).

Tydeidae Kramer, 1877

***Afrotydeus kenyensis* (Baker, 1970)**

Tydeus (*Afrotydeus*) *kenyensis* Baker, 1970: 165.

Tydeus kenyensis; Feres, 2000: 163.

Afrotydeus kenyensis; André, 1980: 106.

Registers on *Hevea*: São Paulo: Macaubal; Mato Grosso: Itiquira (Feres 2000), on *H. brasiliensis*.

Types: on coffee (*Coffea arabica* L., Rubiaceae), Kenya, deposited in BMNH.

***Homeopronematus* sp.**

Registers on *Hevea*: São Paulo: Olímpia (Bellini *et al.* 2005a), São Jose do Rio Preto (Demite & Feres 2005), Cedral (Hernandes & Feres 2006b); Goiás: Goianésia, on *H. brasiliensis*.

***Lorryia formosa* Cooreman, 1958**

Lorryia formosa Cooreman, 1958: 6; Baker, 1968a: 995.

Registers on *Hevea*: São Paulo: Cedral (Feres *et al.* 2002, (Hernandes & Feres 2006b), Olímpia (Bellini *et al.* 2005a), Pariquera-Açu (Zacarias & Moraes 2002), São Jose do Rio Preto (Demite & Feres 2005), Ibitinga; Mato Grosso: Itiquira (Feres 2000, Ferla & Moraes 2002a), Pontes e Lacerda (Ferla & Moraes 2002a), on *H. brasiliensis*.

Types: on *Citrus* sp. (Rutacea), Rhab, Morocco, deposited in IRSN.

Remarks: once considered harmful to citrus crops (Smirnoff 1957); collected from many host plants (Flechtmann 1973); exhibited reproduction by thelytoky when reared on rubber tree leaves, which is possibly the first case of thelytoky in Tydeoidea (Hernandes *et al.* 2006); collected in large population at the base of the leaves.

***Lorryia* spp.**

Registers on *Hevea*: São Paulo: Cedral (Hernandes & Feres 2006b), Olímpia (Bellini *et al.* 2005a), Pariquera-Açu (Zacarias & Moraes 2002), Piracicaba (Zacarias & Moraes 2002, Vis *et al.* 2006), Rio Claro (Flechtmann & Arleu 1984); Mato Grosso: Itiquira, Pontes e Lacerda (Ferla & Moraes 2002a), on *H. brasiliensis*.

Remarks: it may be more than one species; specimens from Rio Claro, Itiquira and Pontes e Lacerda were not examined.

***Melissotydeus* sp.**

Registers on *Hevea*: São Paulo: Olímpia (Bellini *et al.* 2005a), on *H. brasiliensis*.

***Neolorryia boycei* (Baker, 1944)**

Retetydeus boycei Baker, 1944: 78.

Lorryia boycei; Baker, 1968a: 1004; Feres, 2000: 163.

Neolorryia boycei; André, 1980: 127; Kazmierski, 1998: 350.

Registers on *Hevea*: São Paulo: Reginópolis (Feres 2000), on *H. brasiliensis*.

Types: on moss, Laguna de Zempoala, Morelos, Mexico, deposited in USNM.

***Neolorryia* sp.**

Registers on *Hevea*: São Paulo: Piracicaba (Vis *et al.* 2006), on *H. brasiliensis*.

***Parapronematus acaciae* Baker, 1965**

Parapronematus acaciae Baker, 1965: 116.

Registers on *Hevea*: São Paulo: Pariquera-Açu (Zacarias & Moraes 2002), Piracicaba (Zacarias & Moraes 2002, Vis *et al.* 2006), on *H. brasiliensis*.

Types: on *Acacia* sp. leaf (Fabaceae), Leopoldville, Belgian Congo, deposited in USNM.

***Parapronematus* spp.**

Registers on *Hevea*: São Paulo: José Bonifácio, Macaubal, Barretos (Feres 2000), Olímpia (Bellini *et al.* 2005a); Mato Grosso: Itiquira, Pontes e Lacerda (Ferla & Moraes 2002a), on *H. brasiliensis*.

Remarks: it may be more than one species; specimens from Pontes e Lacerda were not examined.

***Pausia* sp.**

Registers on *Hevea*: São Paulo: Piracicaba (Vis *et al.* 2006), on *H. brasiliensis*.

***Pretydeus curiosa* (Ueckermann & Smith-Meyer, 1979)**

Lorryia curiosa Ueckermann & Smith-Meyer, 1979: 44.

Pretydeus curiosa; André, 1980: 143-144.

Registers on *Hevea*: São Paulo: Pariquera-Açu (Zacarias & Moraes 2002), on *H. brasiliensis*.

Types: on *Maytenus nemorosa* (Eckl. Zeyh.) Marais (Celastraceae), Matubatuba (Zululand), deposited in NCAPPRI.

***Pretydeus* sp.**

Registers on *Hevea*: São Paulo: Pariquera-Açu (Zacarias & Moraes 2002), Piracicaba (Vis *et al.* 2006), on *H. brasiliensis*.

***Pronematus ubiquitus* (McGregor, 1932)**

Tydeus ubiquitus McGregor, 1932: 62.

Pronematus ubiquitus; Thor, 1933: 46; Baker, 1939: 273; Baker, 1946: 255; Meyer & Rodriguez, 1966: 19; Baker, 1968b: 1093.

Registers on *Hevea*: São Paulo: Piracicaba (Vis *et al.* 2006), on *H. brasiliensis*.

Types: on *Citrus* sp. foliage (Rutaceae), Lindsay, California, USA, deposited in USNM.

***Pronematus* spp.**

Registers on *Hevea*: São Paulo: Cedral (Feres *et al.* 2002, (Hernandes & Feres 2006b), Pindorama, Taquaritinga (Feres *et al.* 2002), Ibitinga, Macaubal, Pindorama, Reginópolis (Feres 2000), Olímpia (Bellini *et al.* 2005a), Piracicaba

(Zacarias & Moraes 2002, Vis *et al.* 2006), São Jose do Rio Preto (Demite & Feres 2005); Mato Grosso: Itiquira, Pontes e Lacerda (Ferla & Moraes 2002a), on *H. brasiliensis*; Itiquira (Feres 2000), on *H. benthamiana*.

Remarks: *Pronematus ubiqutitus* was reported as predator of eriophyids (Baker & Wharton 1952); it may be more than one species; specimens from Itiquira and Pontes e Lacerda were not examined.

Pseudolorryia cf. nicaraguensis

Registers on *Hevea*: São Paulo: Piracicaba (Vis *et al.* 2006), on *H. brasiliensis*.

Triophtydeus spp.

Registers on *Hevea*: São Paulo: Piracicaba (Vis *et al.* 2006), Cedral, on *H. brasiliensis*.

Tydeus (Tydeus) californicus (Banks, 1904)

Tetranychoides californicus Banks, 1904: 54.

Tydeus californicus; Baker & Wharton, 1952: 192; Fleschner & Arakawa, 1953: 1092.

Tydeus (Tydeus) californicus; Baker, 1970: 174.

Registers on *Hevea*: São Paulo: Pariquera-Açu (Zacarias & Moraes 2002), on *H. brasiliensis*.

Types: on orange leaves (*Citrus* sp, Rutaceae), Watsonville, California, U.S.A., institution of deposition not found.

Tydeus (Tydeus) costensis Baker, 1970

Tydeus (Tydeus) costensis Baker, 1970: 174.

Registers on *Hevea*: São Paulo: Pariquera-Açu (Zacarias & Moraes 2002), on *H. brasiliensis*.

Types: on *Datura* sp. leaf (Solanaceae), Birris, near Cartago, Costa Rica, deposited in USNM.

Tydeus sp.

Registers on *Hevea*: São Paulo: Monte Aprazível (Feres 2000); Campinas (Chiavegato 1968), on *H. brasiliensis*.

Remarks: in Campinas, it was collected in clones of rubber trees (Chiavegato 1968).

ACARIDIDA

Acaridae Ewing & Nesbitt, 1954

Caloglyphus sp.

Registers on *Hevea*: São Paulo: São Jose do Rio Preto (Demite & Feres 2005), on *H. brasiliensis*.

Neotropacarus sp.

Registers on *Hevea*: Mato Grosso: Itiquira (Ferla & Moraes 2002a); São Paulo: Piracicaba (Zacarias & Moraes 2002, Vis *et al.* 2006), Pariquera-Açu (Zacarias & Moraes 2002), on *H. brasiliensis*.

Tyrophagus putrescentiae (Schrank, 1781)

Acarus putrescentiae Schrank, 1781: 521.

Tyrophagus putrescentiae; Oudemans, 1924: 250; Feres 2000: 169.

Registers on *Hevea*: São Paulo: Barretos, Buritama, Pindorama, Reginópolis; Mato Grosso: Itiquira (Feres 2000), Goiás: Goianésia, on *H. brasiliensis*.

Types: institution of deposition, host and locality types not found.

Remarks: pest of culture medium, insect food in laboratories and stored food (Flechtmann 1986).

Tyrophagus sp.

Registers on *Hevea*: Mato Grosso: Itiquira (Ferla & Moraes 2002a), on *H. brasiliensis*.

Histiostomatidae Hughs, 1976

Unidentified species.

Registers on *Hevea*: São Paulo: Barretos, Buritama (Feres 2000), on *H. brasiliensis*.

Remarks: several species are found in wet environments, like exudations of wounded trees (Flechtmann 1975); only hypopus were collected.

Winterschmidtidae Oudemans, 1923

Czenspinksia sp.

Registers on *Hevea*: São Paulo: Olímpia (Bellini *et al.* 2005a), Pariquera-Açu, Piracicaba (Zacarias & Moraes 2002), São Jose do Rio Preto (Demite & Feres 2005), Cedral (Hernandes & Feres 2006b), on *H. brasiliensis*.

Oulenzia sp.

Registers on *Hevea*: São Paulo: Cedral (Feres *et al.* 2002, Hernandez & Feres 2006b), Pariquera-Açu (Zacarias & Moraes 2002), Pindorama (Feres *et al.* 2002), Olímpia (Bellini *et al.* 2005a), Piracicaba (Vis *et al.* 2006), São Jose do Rio Preto (Demite & Feres 2005), Ibatinga; Mato Grosso: Itiquira (Feres 2000, Ferla & Moraes 2002a), on *H. brasiliensis*.

Remarks: *O. arboricola* (Oudemans) was described from *Hevea* leaves in Sumatra; specimens were also collected on jute, in India; reported as phytophagous (Baker & Wharton 1952).

ORIBATIDA

Oribatulidae Thor, 1929

Spinoppia sp.

Registers on *Hevea*: São Paulo: Piracicaba (Vis *et al.* 2006), on *H. brasiliensis*.

Oripodidae Jacot, 1925

Pirnodus sp.

Registers on *Hevea*: São Paulo: Piracicaba (Vis *et al.* 2006), on *H. brasiliensis*.

Unidentified spp.

Registers on *Hevea*: São José do Rio Preto (Demite & Feres 2005), Piracicaba (Vis *et al.* 2006).

Fifty four nominal species and about 50 unidentified species of mites were reported on rubber trees in Brazil. *Calacarus heveae* and *Tenuipalpus heveae* are economically important pests of that culture, reaching great populations at the end of the rainy season and beginning of the dry season. *Phyllocoptruta seringueirae*, being found in large populations in the State of Mato Grosso and São Paulo (Ferla & Moraes 2002a, Bellini *et al.* 2005a, R.J.F. Feres, pers. comm.), is another eriophyid mite that deserves attention.

Seven of the nominal species of mites reported in rubber trees in Brazil belong to Tetranychidae, which comprises agricultural pests for several crops. *Eutetranychus banksi* was registered in great abundance in several rubber tree crops, although no evident damage to the leaves has been noticed.

The family with greatest number of species was Phytoseiidae (257), with preponderantly predatory species (McMurtry & Croft 1997). Zacarias & Moraes (2001) reported nine phytoseiid species on rubber trees in the southern region of the State of São Paulo, suggesting they could be helping to maintain low the population levels of some mite pests. *Euseius citrifolius* was the phytoseiid most commonly found on rubber trees of São Paulo State.

Stigmaeidae is another family with very abundant predatory species, with at least ten species reported to date. Ferla & Moraes (2003b) observed high oviposition rate of *Agistemus floridanus* fed on *C. heveae* and *T. heveae*. However, due to the explosive populational increase and high abundance of these phytophagous in natural conditions, it is highly unlikely that *A. floridanus* can reduce significantly their population.

This work lists 31 sampling points in many States of Brazil (Figure 2). In most rubber tree plantations studied there were only a few isolated samplings (Baker 1945, Chiavegato 1968, Flechtmann & Arleu 1984, Fazolin & Pereira

1989, Flechtmann 1989, Vieira & Gomes 1999, Feres 2000, 2001), but as soon as a harmful pest as *C. heveae* was discovered, several works arose in order to understand the seasonal occurrence of mites on that culture. In some rubber tree plantations of the State of São Paulo the authors conducted samplings every season of the year (Feres *et al.* 2002). A few studies in the States of São Paulo and Mato Grosso conducted monthly samplings for a year of analysis (Bellini *et al.* 2005, Ferla & Moraes 2002). The study conducted in Cedral (Hernandes & Feres 2006b), northwestern region of the State of São Paulo, represents the first long term study of mites of rubber trees, considering three years of monthly samplings, and provides many information concerning the seasonal occurrence of mites.

Not surprisingly, most surveys of mites in rubber trees in Brazil were made in the São Paulo State (Figure 2), which responds to up to 60% of the national latex yield (Gonçalves *et al.* 2001). That disparity in relation to the number of studies conducted in other Brazilian States also reflects the greater number of researchers working on mites in that state.

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Title: Review about mites (Acari) of rubber trees (*Hevea spp.*, Euphorbiaceae) in Brazil

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INDEXES

Species and families of mites found in rubber trees in
Brazil:

(current synonyms in bold)

Acaridae

Acarus cinnabarinus

Acarus coffeae

Acarus putrescentiae

Acarus telarius

Aff. *Acaphyllisa* sp.

Aff. *Aceria* sp.

Aff. *Chakrabartiella* sp.

Afrotyleus kenyensis

Agistemus floridanus

Agistemus aff. *floridanus*

Agistemus sp.

Allonychus braziliensis

Amblyseiopsis ovatus

Amblyseius (Amblyseius) saopaulus

Amblyseius (Iphiseius) concordis

Amblyseius acalyphus

Amblyseius anonymus

Amblyseius compositus

Amblyseius concordis

Amblyseius dominigos

Amblyseius idaeus

Amblyseius impeltatus

Amblyseius neochiapensis

Amblyseius operculatus

Amblyseius ovatus

Amblyseius saopaulus

Amblyseius sexpilis

Amblyseius tunus

Amblyseius zuluagai

Anychus africanus

Anychus latus

Anychus ? latus

Anychus banksi

Anychus clarki

Anychus orientalis

Anychus ricini

Anychus rusti

Anychus verganii

Atrichoproctus uncinatus

Bdellidae

Brevipalpus mcbridei

Brevipalpus papayensis

Brevipalpus phoenicis

Brevipalpus yothersi

Brevipalpus sp.

Calacarus heveae

Caloglyphus sp.

Cheletogenes sp.

Cheletomimus (Hemicheyletia) wellsi

Cheyletia wellsi

Cheyletia sp.

Cheyletidae

Clavidromus jackmickleyi

Clavidromus transvaalensis

Cunaxidae

Cydnodromella alveolaris

Czenspinksia sp.

Daidalotarsonemus sp.

Dendrocheyla wellsi

Eriophyidae

Eryngiopus sp.

Euseius alatus

Euseius citrifolius

Euseius concordis

Euseius flechtmani

Euseius paraguayensis

Eutigmaeus sp.

Eutetranychus banksi

Eutetranychus clarki

Eutetranychus mexicanus

Eutetranychus rusti

Exothorhis caudata

Fungitarsonemus sp.

Galendromimus (Galendromimus) alveolaris

Galendromimus alveolaris

Galendromus (Galendromus) annectens

Galendromus annectens

Galendromus sp.

Hemicheyletia sp.

Hemicheyletia wellsi

Hemitarsonemus latus

Histiostomatidae

Homeopronematus sp.

Iphiseiodes sp.

Iphiseiodes zuluagai

Kampimodromus transvaalensis

Ledermuelleria sp.

Lorryia boyce

Lorryia curiosa

Lorryia formosa

Lorryia spp.

Mediolata sp.

Melissotydeus sp.

Metaseiulus camelliae

Mixonychus sp.

Mononychellus sp.

Neolorryia boycei

Neolorryia sp.

Neoseiulus anonymus

Neoseiulus idaeus

Neoseiulus transvaalensis

Neoseiulus tunus

Neotarsonemus latus

Neotetranychus banksi

Neotropacarus sp.

Oligonychus coffeae

Oligonychus gossypii

Oligonychus merwei

Oribatida

Oribatulidae

Oripodidae

Oulenzia sp.

Paracheyletia wellsi

Parapronematus acaciae

Parapronematus spp.

Paratetranychus bioculatus

Paratetranychus gossypii

Paratetranychus terminalis

Pausia sp.

Phyllocoptura seringueirae

Phytoscutus sexpilis

Phytoseiidae

Pirnodus sp.

Polyphagotarsonemus latus

Pretydeus curiosa

Pretydeus sp.

Pronematus spp.

Pronematus ubiquitus

Proprioiseiopsis dominigos

Proprioiseiopsis ovatus

Pseudobonzia sp.

Pseudolorryia cf. *nicaraguensis*

Pulaeus sp.

Retetydeus boycei

Scutopalus sp.

Septanychus braziliensis
Septanychus mexicanus
Shevtchenkella petiolula
Spinoppia sp.
Stigmaeidae
Tarsonemidae
Tarsonemus confusus
Tarsonemus latus
Tarsonemus spp.
Tenuipalpidae
Tenuipalpus heveae
Tenuipalpus phoenicis
Tetrabdella neotropica
Tetranychidae
Tetranychoides californicus
Tetranychus aduncus
Tetranychus banksi
Tetranychus bioculatus
Tetranychus mexicanus
Tetranychus rusti
Tetranychus sp.
Tetranychus telarius
Tetranychus urticae
Triophtydeus sp.
Tydeidae
Tydeus (Afrotydeus) kenyensis
Tydeus (Tydeus) californicus
Tydeus californicus
Tydeus (Tydeus) costensis
Tydeus sp.
Tydeus ubiquitus
Typhlodromalus aff. *horatii*
Typhlodromalus feresi
Typhlodromina camelliae
Typhlodromips aff. *sinensis*
Typhlodromips amilus
Typhlodromips cananeiensis
Typhlodromips tunus
Typhlodromus (Amblyseius) ovatus
Typhlodromus (Anthoseius) transvaalensis
Typhlodromus (Typhlodromus) alveolaris
Typhlodromus alveolaris
Typhlodromus annectens
Typhlodromus camelliae
Typhlodromus jackmicleyi
Typhlodromus pectinatus
Typhlodromus sexpilis
Typhlodromus transvaalensis
Typhlodromus (Amblyseius) concordis
Tyrophagus putrescentiae
Tyrophagus sp.
Xenotarsonemus sp.
Winterschmidtidae
Zetzellia aff. *yusti*
Zetzellia agistzellia
Zetzellia malvinae
Zetzellia mapuchina
Zetzellia quasagistemas
Zetzellia spp.

Host types of mites found in rubber trees in Brazil:

Acacia sp. (Fabaceae)
Acalypha sp. (Euphorbiaceae)
Arachis hypogaea – peanut (Fabaceae)
Bactris setosa (Arecaceae)
Bromeliaceae.
Camellia sp. (Theaceae)
Cassia bicapsularis (Fabaceae)
Cassia sp. (Fabaceae)
Cattleya sp. (Orchidaceae)
Cephaelis sp. (Rubiaceae)
Citrus paradisi – grapefruit (Rutaceae).
Citrus sinensis (Rutaceae)
Citrus sp. – (Rutaceae)
Coffea arabica – coffee (Rubiaceae)
Cydonia sp. – quince (Rosaceae)
Datura sp. (Solanaceae)
Delphinium belladonna (Ranunculaceae)
Desmodium sp. (Fabaceae)
Fleurya aestuans - nettle (Urticaceae)
Gossypium herbaceum – cotton (Malvaceae)
Hevea brasiliensis (Euphorbiaceae)
Ligustrum sp. (Oleaceae)
Mabea fistulifera (Euphorbiaceae)
Mangifera sp. - mango (Anacardiaceae)
Manihot sp. (Euphorbiaceae)
Maytenus nemorosa (Celastraceae)
Mucuna sp. (Fabaceae)
Musa paradisiaca – banana (Musaceae)
Phoenix sp. (Arecaceae)
Psidium guajava – guava (Mirtaceae)
Quercus sp. (Fagaceae)
Rhododendron indicum - (Ericaceae)
Ricinus communis – castor bean (Euphorbiaceae)
Rubus idaeus L. (Rosaceae)
Spathodea sp. (Bignoniaceae)
Theobroma sp. (Sterculiaceae)
Trema floridana (Ulmaceae)

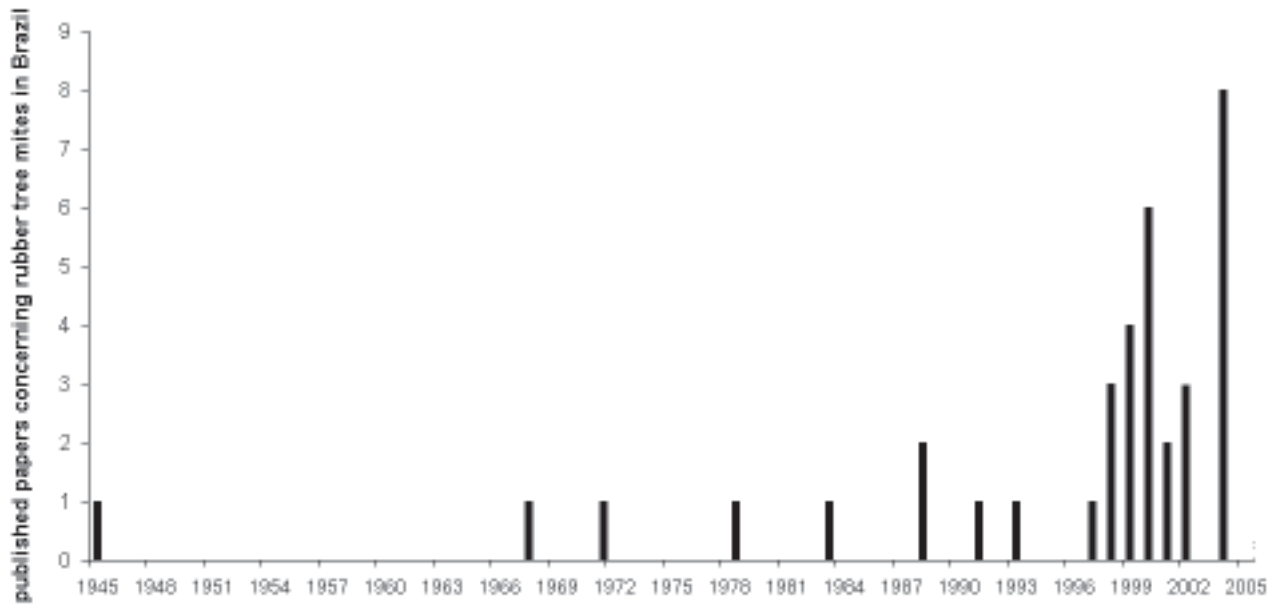


Figure 1. Number of published papers concerning mites on rubber trees in Brazil.



Figure 2. Brazilian states sampled for rubber tree mites (in green); in parenthesis, the number of sites sampled in each state.