

# Scale Insect (Hemiptera: Coccoidea) Pests of Papaya (*Carica papaya*) in Brazil

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**ABSTRACT** Scale insects (Hemiptera: Coccoidea) are widely distributed sap-feeding insects that damage a wide variety of plants, and reduce the productivity and commercial value of many crops, including fruits such as papaya (*Carica papaya*). These pests cause direct and indirect damage to papaya and other plants, and some species of this group are of quarantine importance and, thus, affect export and import of papaya fruit. To determine which species of scale insects commonly occur on papaya in Brazil, a survey of the scale insects on this crop was conducted over four years in commercial orchards located in the principal production regions of papaya in this country. Six species of scale insects were collected: *Aonidiella comperei* McKenzie, *Coccus hesperidum* L., *Dysmicoccus grassii* (Leonardi), *Phenacoccus solenopsis* Tinsley, a *Pseudococcus* species, and *Selenaspilus articulatus* (Morgan). The armored scale *A. comperei* often causes severe damage to the crop and was the most common and widely distributed scale insect species found on papaya in Brazil in this study. This is the first report of *A. comperei* on papaya in the States of Bahia, Ceará, Minas Gerais, and Paraíba, and of *Co. hesperidum* on papaya in Bahia, Ceará, and Rio Grande do Norte, Brazil. Information on the geographic distribution of scale insects that have been recorded on papaya worldwide and in Brazil is summarized.

**KEY WORDS** *Aonidiella comperei*, *Coccus hesperidum*, *Dysmicoccus grassii*, *Phenacoccus solenopsis*, *Pseudococcus* sp

## Introduction

Scale insects (Hemiptera: Coccoidea) are small sap-feeding insects that have a wide geographic distribution and attack a diverse variety of plant hosts, including environmentally valuable forest species, ornamentals, and crops such as papaya (*Carica papaya* L.). Feeding by scale insects may cause yellowing of leaves, defoliation, and reduction of plant vigor and fruit quality, reducing the productivity and commercial value of crops. Besides direct damage to plants, honeydew secreted by many scale insects serves as a substrate for the development of sooty mold fungi, which reduces photosynthesis and causes cosmetic damage to fruits (Beardsley and Gonzalez 1975). Some scale insects are also of quarantine concern and, thus, affect commercialization of plant products (Martins 2003).

Worldwide, 48 species of scale insects have previously been recorded from papaya, and of these, 26 occur in Brazil, but only 8, belonging to four families, have previously been registered on papaya in this

country: *Coccus hesperidum* L. (Coccidae); *Conchaspis angraeci* Cockerell (Conchaspidae); *Aonidiella aurantii* (Maskell), *Aonidiella comperei* McKenzie, *Morganella longispina* (Morgan), and *Selenaspilus articulatus* (Morgan) (Diaspididae); and *Dysmicoccus grassii* (Leonardi) and *Phenacoccus solenopsis* Tinsley (Pseudococcidae) (Culik et al. 2003, 2006, 2007; Martins et al. 2004; Ben-Dov et al. 2014).

*A. comperei* has been considered to be the most important scale insect pest of papaya in the principal regions of production of this crop in Brazil including areas in the States of Espírito Santo, Bahia, and Rio Grande do Norte (Martins et al. 2004, Martins and Fanton 2006). However, the status of scale insect pests of papaya in Brazil needs to be better determined with more complete sampling. Therefore, a survey of scale insects was conducted in the major papaya producing regions of Brazil to determine what species of scale insects are currently found on this crop and to determine their distribution and frequency as part of the research needed for integrated management of these pests in papaya orchards.

## Materials and Methods

Scale insects were surveyed from November 2002 to October 2006 in commercial orchards of the principal papaya producing regions of Brazil (Northern Espírito Santo, Southern Bahia, Coastal Rio Grande do Norte,

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**Fig. 1.** Location of the municipalities sampled (indicated by dark shading) for scale insects on papaya in the principal regions of papaya production in Brazil.

the Chapada do Apodi of Rio Grande do Norte and Ceará, Lower Acaraú Ceará, and regions of Minas Gerais and Paraíba States). In total, 236 samples were collected in infested papaya orchards in 38 municipalities of six States: Bahia (23 samples in eight municipalities), Ceará (50 samples in five municipalities), Espírito Santo (109 samples in 10 municipalities), Minas Gerais (two samples in one municipality), Paraíba (three samples in one municipality), and Rio Grande do Norte (49 samples in 13 municipalities; Fig. 1).

The canopies of 10 papaya plants were examined for the presence of scale insects in each orchard sampled. Occasionally, an additional sample was collected in the same area if specimens were observed that appeared to be different from those previously collected. Trunk bark (epidermis), peel (epicarp) of fruits, and leaves of papaya infested with scale insects were collected, cut into 2- by 2-cm pieces, preserved in 70% alcohol, and sent to specialists for identification. Diaspididae were identified by V. R. S. Wolff, Fundação Estadual de Pesquisa Agropecuária (FEPAGRO), Porto Alegre, Brazil, and by Dr. D. Miller, Systematic Entomology Laboratory, Beltsville, USA; Coccidae by Dr. A. L. B. G.

Peronti of the Universidade Federal de São Carlos (UFSCar), São Carlos, Brazil, and Dr. T. Kondo of the University of California, Davis, USA; and Pseudococcidae were identified by Dr. G. Evans, APHIS, Beltsville, USA. Voucher specimens are deposited in the arthropod collections of the Instituto Capixaba de Pesquisa, Assistência Técnica e Extensão Rural, Vitória, Espírito Santo, Brazil; FEPAGRO, and UFSCar.

### Results and Discussion

Six species of scale insects were found on papaya plants and fruits in this study: *A. comperiei*, *Co. hesperidum*, *D. grassii*, *P. solenopsis*, *Pseudococcus* sp., and *S. articulatus* (Table 1), principally infesting fruits (97%) rather than leaves (1%) or trunks (2%) of the plants sampled.

*A. comperiei* was the most widespread and frequently encountered species, present in all 38 municipalities and in 83% of the samples. This species was found associated predominantly with papaya fruits (97%), and was the only species found on trunks (3%). *Co. hesperidum* was the second most frequent species, present in

**Table 1.** Scale insect species (Hemiptera: Coccidae, Diaspididae, Pseudococcidae) collected on papaya in the principal papaya-producing regions of Brazil, 2002–2006

Family species	State <sup>a</sup>	Municipality (number of samples)
Coccidae		
<i>Co. hesperidum</i>	BA	Mucuri (4)
	CE	Acaraí (3), Marco (2), Varjota (2)
	ES	Aracruz (3), Linhares (19), Sooretama (1)
	RN	Baraúna (1), Ceará Mirim (1)
Diaspididae		
<i>A. comperei</i>	BA	Alcobaça (1), Eunápolis (4), Itabela (2), Itamarajú (2), Mucuri (4), Nova Viçosa (1), Prado (1), Teixeira de Freitas (4)
	CE	Acaraí (15), Marco (4), Paraipaba (10), Quixaré (6), Varjota (8)
	ES	Aracruz (10), Boa Esperança (3), Jaguaré (2), Linhares (32), Montanha (3), Pedro Canário (8), Pinheiros (8), Rio Bananal (2), São Mateus (5), Sooretama (9)
	MG	Nanuque (2)
	PB	Mamanguabe (3)
	RN	Alto Rodrigues (1), Baraúna (3), Canguaretama (2), Ceará Mirim (12), Jandaíra (2), Macaíba (1), Maxaranguape (2), Nízia Floresta (1), Parnamirim (5), Pureza (3), Rio do Fogo (4), São José do Mipibú (8), Touros (2)
	RN	Ceará Mirim (1)
<i>S. articulatus</i>	RN	Ceará Mirim (1)
Pseudococcidae		
<i>Dysmicoccus grassii</i>	ES	Aracruz (2)
<i>P. solenopsis</i>	ES	Linhares (1)
<i>Pseudococcus</i> sp.	ES	Sooretama (1)

<sup>a</sup> State: BA (Bahia), CE (Ceará), ES (Espírito Santo), MG (Minas Gerais), PB (Paraíba), RN (Rio Grande do Norte).

15% of the samples, most frequently associated with papaya fruits (94%), and found in only two samples of papaya leaves. *D. grassii*, *P. solenopsis*, *Pseudococcus* sp., and *S. articulatus* were found only on fruit and each was found in only one or two (<1%, each) of the samples collected (Table 1).

Although at least 48 scale insect species have been recorded on papaya worldwide (Table 2), results of the present study confirm that relatively few occur on papaya in the major regions of production of this fruit in Brazil, with the species *A. comperei* being of most importance because it has widespread distribution and frequent occurrence. It causes cosmetic damage to fruit and weakens plants, and is also of concern as a pest of quarantine significance.

*A. comperei* (Fig. 2a) is widely distributed geographically, occurring in the Australasian, Neotropical, Oriental, and Palearctic regions, but has been reported on relatively few host plants, such as *Annesijoa* sp., *Annona muricata*, *Citrus aurantifolia*, *C. grandis*, *Cocos nucifera*, *Cucurbita maxima*, *Diospyros* sp., *Ficus* sp., *Morinda citrifolia*, *Musa* sp., *Pluchea odorata*, and *Vitis* sp., as well as *C. papaya* (Ben-Dov et al. 2014). *A. comperei* has been noted as a pest of papaya in the Pacific region (Culik et al. 2003) and is the most common pest intercepted on Brazilian papaya fruit exported to the United Kingdom (C. Malumphy, personal communication). In Brazil, this species was recorded in the States of Alagoas, Paraíba, Pernambuco, and Rio de Janeiro, on various hosts (Silva et al. 1968). More recently, its occurrence on papaya was registered in Ceará, Espírito Santo, and Rio Grande do Norte (Martins et al. 2004). Results of the present study indicate that this species also occurs on papaya in Bahia, Paraíba, and Minas Gerais, and these are the first records of this species in Bahia and Minas Gerais. Besides causing cosmetic damage to fruits, heavy infestations of this insect on trunks of papaya (Fig. 2b) may

weaken them leading to toppling of plants due to wind or the weight of the fruit. Because *A. comperei* is capable of rapid multiplication and spread in papaya orchards, it causes severe damage to plants and fruits, and is a quarantine pest; it has become the most important scale insect pest of papaya in Brazil (Martins and Fanton 2006). The results of the present study confirm that this species is widely distributed and common in papaya orchards in the principal regions of papaya production in the country. However, although *A. comperei* is considered to be a quarantine pest for the United States, Watson (2005) indicates that *Aonidiella inornata* McKenzie, 1938, which has been recorded in the United States, may be a synonym of *A. comperei*. Therefore, research to determine the taxonomic status of *A. comperei* with respect to *A. inornata* is warranted to verify if such quarantine concerns are justified.

*Co. hesperidum* (Fig. 2c) is a cosmopolitan and polyphagous scale insect species that is known as a pest of papaya in Florida and Hawaii, USA (Culik et al. 2003), and may also be a pest of crops such as grapes and citrus in some areas due to cosmetic damage it causes to fruit (Beardsley and Gonzalez 1975, Elmer and Brawner 1975, Copland and Ibrahim 1985, Bock and Tarragó 1995, Walton et al. 2009). In Brazil, this species is widely distributed and has previously been noted on papaya in Espírito Santo (Martins et al. 2004). This is the first record of *Co. hesperidum* in the States of Ceará and Rio Grande do Norte, Brazil. The species is the second most important scale insect on papaya in this country, occurring on fruit and leaves of plants. Results of the present study indicate that although *Co. hesperidum* occurs in most regions of papaya production in Brazil, it normally is not common, perhaps due to control by natural enemies (Culik et al. 2011).

The diaspidid *S. articulatus*, and three mealybug species, *P. solenopsis*, *D. grassii*, and *Pseudococcus* sp., were found only occasionally in papaya orchards in this

Table 2. Biogeographic distribution of scale insects recorded on papaya and their distribution in Brazil (based on Ben-Dov et al. 2014 and additional references cited)

Family species	Biogeographic distribution <sup>a</sup>		Distribution in Brazil <sup>b</sup>		Reference
	State		On papaya		
Asterolecaniidae					
<i>Russellaspis pustulans pustulans</i> (Cockerell)	AF, AU, NE, NT, OR, PC	BA			Silva et al. (1968), Martins et al. (2004), Culik et al. (2007, 2009)
Coccidae					
<i>Coccus discrepans</i> (Green)	OR, PA		AM, BA, ES, PA, RJ, RS, SC, SP	ES	Culik et al. (2007)
<i>Co. hesperidam</i> L.	AF, AU, NE, NE, NT, OR, PC		ES, MG		
<i>Coccus longulus</i> (Douglas)	AUS, OR, PC				
<i>Drepanococcus chiton</i> (Green)	AF, AU, NE, NT, OR, PC		ES, RJ, RS, SP		Culik et al. (2007)
<i>Eucalyptinus tessellatus</i> (Signoret)	AF, AU, NE, NT, OR, PC		MG, SP, SU		Silva et al. (1968)
<i>Mitiscutulus mangiferae</i> (Green)	AF, AU, NE, NT, PC		RS, SP		
<i>Parasaissetta nigra</i> (Nietner)	NE, NT				
<i>Philephedra tuberculosa</i> Nakahara & Gill	AF, NE, NT, OR, PC		BA, PA, RS, SP		Pantoja et al. (2002)
<i>Protapulecinaria pyriformis</i> (Cockerell)	AF, AU, NE, NT, OR, PC		AM, BA, MG, PA, PB, PE, PR, RJ,		Silva et al. (1968)
<i>Saissetia coffeae</i> (Walker)	AF, AU, NE, NT, OR, PC		RS, SC, SP		
<i>Saissetia oleae oleae</i> (Olivier)					
Conchaspidae					
<i>Conchaspis angraeci</i> Cockerell	AF, AU, NE, NT, OR, PC	BA, RJ			Silva et al. (1968)
Diaspididae					
<i>Aonidiella aurantii</i> (Maskell)	AF, AU, NE, NT, OR, PC	AL, CE, DF, MA, PA, PB, PE, PR, RJ, RN, RS, SC, SP		SU	Silva et al. (1968), Claps et al. (2001), Claps and Wolff (2003)
<i>A. comperi</i> McKenzie	AU, NT, OR, PC	AL, ES, PB, PE, RJ, RN		ES, RN	Silva et al. (1968), Claps et al. (2001), Martins et al. (2004), Culik et al. (2008, 2011)
<i>Aonidiella inornata</i> McKenzie	AF, AU, NE, NT, OR, PC				Claps et al. (2001)
<i>Aonidiella orientalis</i> (Newstead)	AF, AU, NE, NT, OR, PC				Claps et al. (2001)
<i>Aonidomytilus albus</i> (Cockerell)	AF, NE, NT, OR		AM, BA, PB, RS		Silva et al. (1968), Culik et al. (2008, 2011)
<i>Aspidiotus destructor</i> Signoret	AF, AU, NE, NT, OR, PC		AM, BA, CE, DF, FN, ES, MA, PA, PB, PE, PI, RJ, RN, SC, SP, SE		
<i>Aspidiotus excisus</i> Green	AU, NE, NT, OR, PC				
<i>Aspidiotus naefarlamet</i> Williams & Watson	AU				
<i>Chrysomphalus dictyospermi</i> (Morgan)	AF, AU, NE, NT, OR, PC		BA, DF, ES, PA, RJ, RS, SP		Silva et al. (1968), Culik et al. (2008)
<i>Clacaspis herculeana</i> (Cockerell & Hadden)	AF, AU, NE, NT, OR, PC		SP		Silva et al. (1968)

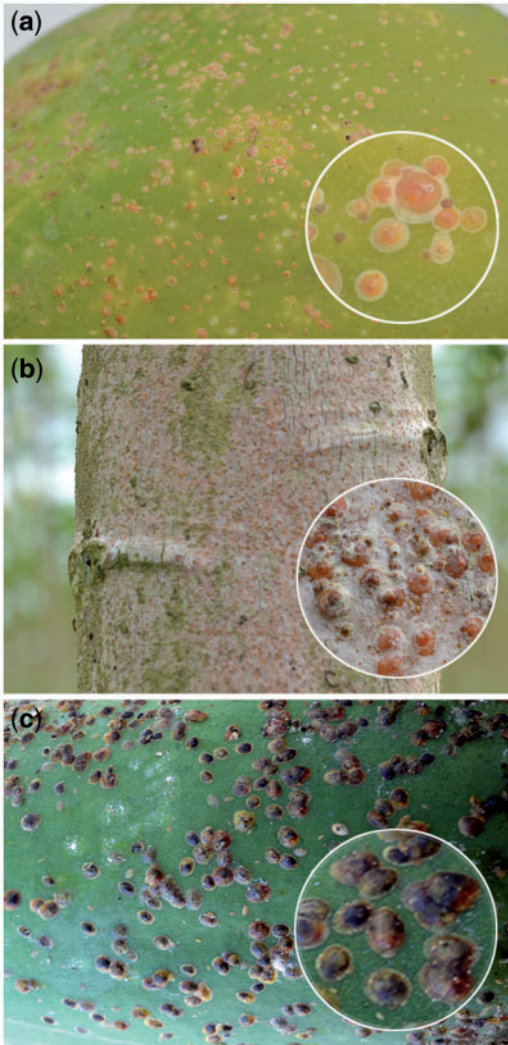
(Continued)

**Table 2. (continued)**

Family species	Biogeographic distribution <sup>a</sup>		Reference
	Distribution in Brazil <sup>b</sup>	On papaya	
	State		
<i>Hemiberlesia lataniae</i> (Signoret)	AF, AU, NE, NT, OR, PC	ES, MG, PA, RJ, RS, SP	Silva et al. (1968), Culik et al. (2008)
<i>Hoccardia biclavis</i> (Comstock)	AF, AU, NE, NT, OR, PC	BA, MG, RJ, SP	Silva et al. (1968), Culik et al. (2011)
<i>Morganella curoensis</i> (Cockerell)	NE, OR		
<i>M. longispina</i> (Morgan)	AF, AU, NE, NT, OR, PC	PR, RJ, RS, SC, SP	Silva et al. (1968), Claps et al. (2001), Claps and Wolff (2003)
<i>Pseudonidia trilobitiformis</i> (Green)	AF, AU, NE, NT, OR, PC	BA, CE, ES, MG, PA, PB, PE, PR, RJ, RN, RS, SP	Culik et al. (2008, 2009), Silva et al. (1968)
<i>Pseudaulacaspis cockerelli</i> (Cooley)	AF, AU, NE, NT, OR, PC		
<i>Pseudaulacaspis pentagona</i> (Targioni Tozzetti)	AF, AU, NE, NT, OR, PC	BA, CE, ES, MG, PA, PB, PE, PR, RJ, RN, RS, SC, SP	Silva et al. (1968), Culik et al. (2008, 2011)
<i>Pseudoparlatoria ostreata</i> Cockerell	AF, NE, NT, PC		
<i>Pseudoparlatoria parlatorioides</i> (Comstock)	AF, AU, NE, NT, OR, PC	ES, MG, RJ, RS, SP	Silva et al. (1968), Culik et al. (2008)
<i>S. articulatus</i> (Morgan)	AF, AU, NE, NT, OR, PC	BA, ES, PA, RJ, RN, SP	Silva et al. (1968), Claps et al. (2001), Loayza and Parra (2001), Martins et al. (2004), Culik et al. (2008)
<b>Margarodidae</b>			
<i>Crypticeria multicastrices</i> Kondo & Uuh	NT		
<i>Icerya aegyptiaca</i> (Douglas)	AF, AU, OR, PC		
<i>Icerya samarita</i> (Morrison)	AU, OR		
<b>Pseudococcidae</b>			
<i>D. grassii</i> (Leonardi)	AF, NE, NT, OR, PC	ES	Culik et al. (2006, 2007, 2009)
<i>Dysmicoccus nesophilus</i> Williams & Watson	AU		
<i>Ferrisia virgata</i> (Cockerell)	AF, AU, NE, NT, OR, PC	AM, BA, ES, PA, PB, RJ, RN, SP	Silva et al. (1968), Culik et al. (2006, 2007, 2011)
<i>Leptococcus neotropicus</i> (Williams & Granara de Willink)	NT		
<i>Macrollicoccus hirsutus</i> (Green)	AF, AU, NE, NT, OR, PC	ES, RR	Culik et al. (2013a,b), Marsaro et al. (2013)
<i>Nipaecoccus viridis</i> (Newstead)	AF, AU, NE, NT, OR, PC		
<i>Paracoccus marginatus</i> Williams & Granara de Willink	AF, AU, NE, NT, OR, PC		
<i>P. solenopsis</i> Tinsley	AF, AU, NE, NT, OR		
<i>Pseudococcus jackbeardsleyi</i> Gimpel & Miller	AF, AU, NE, NT, OR, PC	BA, CE, ES, PB	Culik et al. (2007)
<i>Pseudococcus longispinus</i> (Targioni Tozzetti)	AF, AU, NE, NT, OR, PC	ES, RS	Culik et al. (2007, 2009)
<i>Pseudococcus solenidos</i> Gimpel & Miller	NE	ES, RS, SC, SP	Gimpel and Miller (1996)
<i>Pseudococcus viburni</i> (Signoret)	AF, AU, NE, NT, OR, PC	ES, RS	Culik et al. (2005, 2007, 2009)

<sup>a</sup> Biogeographic regions: AF (Afrotropical), AU (Australasian), NE (Nearctic), NT (Neotropical), OR (Oriental), PC (Palearctic).

<sup>b</sup> Brazilian State or Area: AL (Alagoas), AM (Amazonas), BA (Bahia), CE (Ceará), DF (Distrito Federal), ES (Espírito Santo), FN (Fernando de Noronha), MA (Maranhão), MG (Minas Gerais), PA (Pará), PB (Paraíba), PE (Pernambuco), PI (Piauí), PR (Paraná), RJ (Rio de Janeiro), RN (Rio Grande do Norte), RR (Roraima), RS (Rio Grande do Sul), SC (Santa Catarina), SP (São Paulo), SE (Sergipe), SU (State unidentified).



**Fig. 2.** *A. comperei* on the fruit (a) and trunk (b) and *Co. hesperidum* on fruit of papaya (c).

study (i.e. found in one or two samples from single municipalities). Thus, although these species may be potential pests of papaya (Culik et al. 2007, 2008), results of the present study indicate that these species are normally of no importance for this crop in this country at this time.

*S. articulatus* has a cosmopolitan distribution and has been reported on plants of 48 families in Africa, Asia, Europe, and North and South America. In Brazil, this species has previously been recorded in the States of Bahia, Espírito Santo, Pará, Rio de Janeiro, and São Paulo (Claps et al. 2001, Loayza and Parra 2001, Cassino and Rodrigues 2005, Ben-Dov et al. 2014), and noted on papaya fruits in Rio Grande do Norte (Martins et al. 2004).

*D. grassii*, which was found in only two samples from papaya fruits in the municipality of Aracruz, Espírito Santo, Brazil, has previously been reported in the

Afrotropical, Nearctic, Neotropical, Oriental, and Palearctic regions on species of 24 botanical families, including *Ananas comosus*, *Annona squamosa*, *Asparagus* sp., *Callistemon citrinus*, *C. papaya*, *Codiaeum* sp., *Coffea arabica*, *Coffea canephora*, *Coccoloba diversifolia*, *Coccoloba wifera*, *Ficus benjamina*, *Ficus* sp., *Lysiloma latisiquum*, *Mangifera indica*, *Musa acuminata*, *Musa sapientum*, *Passiflora edulis*, *Persea borbonia*, *Punica granatum*, *Rhizophora mangle*, and *Theobroma cacao* (Miller and Miller 2002, Williams 2004). This polyphagous scale insect is of economic importance on banana, coffee, and pineapple (Williams and Granara de Willink 1992, Matile-Ferrero and Williams 1995, Ben-Dov et al. 2014) and has been previously noted on papaya and on *C. canephora* in Espírito Santo, Brazil (Culik et al. 2006, 2009).

*P. solenopsis*, collected in one sample of papaya fruit in the municipality of Linhares, Espírito Santo, was described from United States where it is widespread (Ben-Dov et al. 2014). This insect was reported in the Caribbean and Ecuador as a pest of *Solanum muricatum* (Williams and Granara de Willink 1992, Larrain 2002), and on cotton in India, Pakistan, and Thailand (Hodgson et al. 2008; Jhala et al. 2008a,b; Nagrare et al. 2009; Ahmad et al. 2011; Tanwar et al. 2011), southeast Asia, and West Africa (Muniappan et al. 2009, 2012). *P. solenopsis* has been recorded from 154 plant species, including field crops, vegetables, ornamentals, weeds, and trees, causing economic damage to crops such as cotton, okra, tomato, sesame, and sunflower, with plant death noted with severe infestations (Arif et al. 2009, Vennila et al. 2013). Environmental factors such as low temperature and humidity may limit its distribution, and irrigation may favor it (Wang et al. 2010). Biotic factors, particularly parasitism, seemed to have importance in regulating this mealybug (Kedar et al. 2012). *P. solenopsis* was first recorded in Brazil on *Solanum lycopersicum* (Culik and Gulan 2005) and has also been recorded on papaya in the Ceará and Espírito Santo (Culik et al. 2007, 2011).

The diaspidid species *M. longispina* (synonyms *Aspidiotus longispinus*, *Aspidiotus longispina*, *Aspidiotus maskelli*, *Aspidiotus ornatus*, *Hemiberlesia longispina*, *Hemiberlesia maskellii*, and *Morganella maskellii*), which has been reported on species from 22 plant families, including Caricaceae (Ben-Dov et al. 2014), has been frequently cited as a common pest (on trunks) of papaya in Brazil (Martins 2003), and the fact that this species was not encountered in the present study suggests that some past references to *M. longispina* as a pest of papaya in Brazil may have been misidentifications of similar, common species such as *A. comperei*.

The invasive papaya mealybug *Paracoccus marginatus* Williams and Granara de Willink (Hemiptera: Pseudococcidae) was not found on papaya in this study, and it has not been recorded in South America (Ben-Dov et al. 2014). This polyphagous mealybug infests a diverse range of hosts in many biogeographic regions (Table 2). On papaya, this mealybug infests the veins of older leaves, which turn yellow, dry up, and are shed prematurely, and also all parts of young leaves and fruits; papaya trees may die within a few months of

becoming infested (Heu et al 2007, Germain et al 2010, Ben-Dov et al 2014). Several neotropical sap-sucking insects have been accidentally introduced, such as the papaya mealybug *P. marginatus* in Central American countries and the Caribbean region (Galanibe et al 2010, Sharma et al 2013, Ben-Dov et al 2014). This shows the necessity of monitoring the dispersion of this mealybug into South America to avoid its spread, mainly to papaya-producing regions.

The scale insect species *A. comperei*, *Co. hesperidum*, *D. grassii*, *P. solenopsis*, *Pseudococcus* sp., and *S. articulatus* were found on papaya in the principal producing regions of Brazil. *A. comperei* is the most widespread and common scale insect on papaya in Brazil. This species often causes severe damage to fruits of this plant, and it is the most important scale insect pest of Brazilian papaya. These are the first records of *A. comperei* on papaya in the States of Bahia, Ceará, Minas Gerais, and Paraíba; and of *Co. hesperidum* in Bahia, Ceará, and Rio Grande do Norte, Brazil. Thus, monitoring of these scale species should be included in the integrated pest management programs of papaya in Brazil to minimize damage by these pests to this crop.

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