Scale insects (Hemiptera: Coccoidea) found on dracaena and ficus plants (Asparagales: Asparagaceae, Rosales: Moraceae) from southeastern Asia

Soo-Jung Suh
Plant Quarantine Technology Center
476 Dongtanji-seong-ro
Yeongtong-gu
Suwon, South Korea 443-400

Khanxay Bombay
Plant Protection Center
Department of Agriculture/MAF
Thadeua road KM 13
Vientiane Capital, Lao PDR

Date of Issue: October 30, 2015
Scale insects (Hemiptera: Coccoidea) found on dracaena and ficus plants (Asparagales: Asparagaceae, Rosales: Moraceae) from southeastern Asia

Insecta Mundi 0448: 1–10

ZooBank Registered: urn:lsid:zoobank.org:pub:74710169-5E50-4D4A-90D7-928575D9D82E

Published in 2015 by
Center for Systematic Entomology, Inc.
P. O. Box 141874
Gainesville, FL 32614-1874 USA
http://centerforsystematicentomology.org/

**Insecta Mundi** is a journal primarily devoted to insect systematics, but articles can be published on any non-marine arthropod. Topics considered for publication include systematics, taxonomy, nomenclature, checklists, faunal works, and natural history. **Insecta Mundi** will not consider works in the applied sciences (i.e. medical entomology, pest control research, etc.), and no longer publishes book reviews or editorials. Insecta Mundi publishes original research or discoveries in an inexpensive and timely manner, distributing them free via open access on the internet on the date of publication.

**Insecta Mundi** is referenced or abstracted by several sources including the Zoological Record, CAB Abstracts, etc. **Insecta Mundi** is published irregularly throughout the year, with completed manuscripts assigned an individual number. Manuscripts must be peer reviewed prior to submission, after which they are reviewed by the editorial board to ensure quality. One author of each submitted manuscript must be a current member of the Center for Systematic Entomology.

**Chief Editor**: Paul E. Skelley, e-mail: insectamundi@gmail.com
**Assistant Editor**: David Plotkin, e-mail: insectamundi@gmail.com
**Head Layout Editor**: Eugenio H. Nearns
**Editorial Board**: J. H. Frank, M. J. Paulsen, Michael C. Thomas
**Review Editors**: Listed on the Insecta Mundi webpage

**Manuscript Preparation Guidelines** and **Submission Requirements** available on the Insecta Mundi webpage at: http://centerforsystematicentomology.org/insectamundi/

**Printed copies (ISSN 0749-6737) annually deposited in libraries:**
CSIRO, Canberra, ACT, Australia
Museu de Zoologia, São Paulo, Brazil
Agriculture and Agrifood Canada, Ottawa, ON, Canada
The Natural History Museum, London, UK
Muzeum i Instytut Zoologii PAN, Warsaw, Poland
National Taiwan University, Taipei, Taiwan
California Academy of Sciences, San Francisco, CA, USA
Florida Department of Agriculture and Consumer Services, Gainesville, FL, USA
Field Museum of Natural History, Chicago, IL, USA
National Museum of Natural History, Smithsonian Institution, Washington, DC, USA
Zoological Institute of Russian Academy of Sciences, Saint-Petersburg, Russia

**Electronic copies (Online ISSN 1942-1354, CDROM ISSN 1942-1362) in PDF format:**
Printed CD or DVD mailed to all members at end of year. Archived digitally by Portico.
Florida Virtual Campus: http://purl.fcla.edu/fcla/insectamundi
University of Nebraska-Lincoln, Digital Commons: http://digitalcommons.unl.edu/insectamundi/
Goethe-Universität, Frankfurt am Main: http://nbn-resolving.de/urn/resolver.pl?urn:nbn:de:hebis:30:3-135240

**Copyright** held by the author(s). This is an open access article distributed under the terms of the Creative Commons, Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original author(s) and source are credited. http://creativecommons.org/licenses/by-nc/3.0/

**Layout Editor for this article**: Eugenio H. Nearns
Scale insects (Hemiptera: Coccoidea) found on dracaena and ficus plants (Asparagales: Asparagaceae, Rosales: Moraceae) from southeastern Asia

Soo-Jung Suh  
Plant Quarantine Technology Center  
476 Dongtanjiseong-ro  
Yeongtong-gu  
Suwon, South Korea 443-400  
suhsj97@gmail.com

Khanxay Bombay  
Plant Protection Center  
Department of Agriculture/MAF  
Thadeua road KM 13  
Vientiane Capital, Lao PDR

Abstract: A collaborative survey of the scale insects (Hemiptera: Coccoidea) found on dracaena and ficus plants in Cambodia, Laos, Thailand and Vietnam conducted in 2015 identified 49 species of scale insects belonging to 36 genera in six families (25 species on dracaena, 42 species on ficus). Of the species of scale insects that have been reported on dracaena and ficus plants in southeastern Asia in the ScaleNet database (Ben-Dov et al. 2015), 32% and 17% were species collected in this survey, respectively. Twenty-three species (47%) of scale insects have been intercepted at Korean ports of entry on imported dracaena and ficus plants from southeastern Asia from 1996 to 2014 (PIS 2015). Additionally, this list of species collected on these plants from exporting countries could be utilized as a basis for possible preventive measures in quarantine and inspection of traded products.

Key words: Cambodia, coccids, Dracaena, Ficus, Laos, Thailand, Vietnam

Introduction

Scale insects (Hemiptera: Coccoidea) are one of the pest groups commonly transported on plant products by travelers and commercial trade. Many of these species are regularly introduced and dispersed among countries as a consequence of international plant trade. Through these means, they are one of the most successful groups in terms of invading new geographical areas (Pellizzari and Dalla Montá 1997), and an increasing number of species have become cosmopolitan due to such anthropogenic activities.

In Korea, the amount of plant material imported from other countries has increased markedly in recent years. Ornamental plants comprise about 37% of the plants that are imported into Korea (PIS 2015). Shipments of Dracaena Vand. ex L. (Asparagaceae) and Ficus L. (Moraceae) plants are most frequently imported from southeastern Asia, which has a subtropical and tropical climate, and many of these plants serve as hosts for scale insects. Therefore, researchers and quarantine inspectors need to be aware of which species occur on dracaena and ficus plants from southeastern Asia imported into Korea. In 2015, a collaborative survey was conducted by researchers from Laos and Korea at places such as botanical gardens and public parks in Cambodia, Laos, Thailand and Vietnam, where dracaena and ficus plants are grown. As a result, 49 species of scale insects belonging to 36 genera and six families were identified (Tab. 1).

To date, 25 species and 42 species of scale insects have been found on dracaena and ficus plants, respectively, in these four countries. Based on a 2015 query of the ScaleNet database (Ben-Dov et al. 2015) of all the species of scale insects reported on dracaena and ficus plants in southeastern Asia, 32% and 17% of these species were collected during this survey (Tab. 2–3). Once exotic species of scale insects are introduced and become established in a country, they can be impossible to eradicate, and the collateral environmental and economic implications are substantial as well. Accordingly, a possible preventive measure is required to prevent the introduction of exotic pests into Korea.
This paper provides a list of 49 species of scale insects collected on dracaena and ficus plants from Cambodia, Laos, Thailand and Vietnam.

Materials and Methods

The specimens used in this study were collected from leaves, twigs, roots and fruits of dracaena and ficus plants from January to July 2015. Some of the specimens of the species reported in this paper were mounted on microscope slides in Canada balsam mounting medium for identification and the others were stored in alcohol. The specimens that were studied are deposited in the Collection of Plant Quarantine Technology Center, QIA at Korea. This list presents the identifications of the specimens to species level, depending upon the quality of the sample and the life stage that was collected and the current available taxonomic knowledge of the taxon (Williams and Watson 1988a, 1988b, 1990; Williams 2004; Miller and Davidson 2005; Ben-Dov et al. 2015). Also these publications were used to identify Coccoidea specimens. The taxonomic nomenclature used here for the scale insects follows those in the ScaleNet database (Ben-Dov et al. 2015). The material examined was collected by the following people; Soo-Jung Suh (SS), Sang-Il Gim (SG) and Phokaothong Sykaisone (PS). Photographs were taken using an AxioCam MRc5 camera mounted on a ZEISS Axio Imager M2 Microscope and a Leica M165C microscope with a Delta pix camera.

Results

The following is a list of the scale insects collected on dracaena and ficus plants in Cambodia, Laos, Thailand and Vietnam from the survey conducted in 2015.

List of scale insects

Coccidae

1. *Ceroplastes ceriferus* (Fabricius)

   **Material examined.** Laos: Bolikhamxay, Paksan, 2 ♀, on *Ficus* (leaf), 29-iv-2015, SS; Vientiane Capital, 1 ♀, on *Ficus* (leaf), 1-v-2015, SS; Vientiane Capital, Chanthabouly, 1 ♀, on *Dracaena* (leaf), 27-iv-2015, PS; same locality, 1 ♀, on *Ficus* (leaf), 27(iv)-2015, SS; Vientiane Province, Nalao, 3 ♀, on *Ficus* (leaf), 28-iv-2015, SS.

2. *Ceroplastes rubens* Maskell

   **Material examined.** Laos: Bolikhamxay, Paksan, 1 ♀, on *Dracaena* (leaf), 29-iv-2015, SS.

3. *Ceroplastes xishuangensis* Tang and Xie

   **Material examined.** Vietnam: Ho Chi Minh, 5 ♀, on *Ficus* (twig), 6-iii-2015, SG; same locality, 1 ♀, on *Ficus* (leaf), 28-iii-2015, SG.

4. *Coccus hesperidum* Linnaeus

   **Material examined.** Vietnam: Ho Chi Minh, 3 ♀, on *Dracaena* (leaf), 16-iii-2015, SG.

5. *Coccus viridis* (Green)

   **Material examined.** Laos: Vientiane Capital, Chanthabouly, 5 ♀, on *Ficus* (leaf), 27-iv-2015, PS.

6. *Drepanococcus chiton* (Green) (Fig. 1)

   **Material examined.** Laos: Bolikhamxay, Khamkeut, 3 ♀, on *Ficus* (leaf), 30-iv-2015, PS; Vientiane Capital, Srikhottabong, 2 ♀, on *Ficus* (leaf), 27-iv-2015, PS; Vientiane, Naxaythong, 2 ♀, on *Ficus* (leaf), 28-iv-2015, PS.
7. *Milviscutulus mangiferae* (Green)
**Material examined.** Laos: Champasak, Pakse, 2 ♀, on *Ficus* (leaf), 17-vi-2015, PS; Vientiane Capital, Sikhottabong, 13 ♀, on *Dracaena* (leaf), 27-iv-2015, PS; Xieng Kaung, Paek, 4 ♀, on *Dracaena* (leaf, twig), 14~15-vii-2015, PS; same locality, 14 ♀, on *Ficus* (leaf), 13~15-vii-2015, PS. Thailand: Khon Kaen, 2 ♀, on *Dracaena* (leaf), 6-i-2015, PS.

8. *Paralecanium quadratum* (Green) (Fig. 2)
**Material examined.** Laos: Bolikhamxay, Khamkeut, 4 ♀, on *Ficus* (leaf), 30-iv-2015, PS.

9. *Parasaissetia nigra* (Nietner) (Fig. 3)
**Material examined.** Vietnam: Ho Chi Minh, 3 ♀, on *Dracaena* (twig), 15-iii-2015, SG.

10. *Pulvinaria polygonata* Cockerell
**Material examined.** Laos: Vientiane Capital, Chanthabouly, 2 ♀, on *Ficus* (leaf), 1-v-2015, SS.

Conchaspididae

11. *Conchaspis angraeci* Cockerell
**Material examined.** Laos: Vientiane Capital, Sikhottabong, 7 ♀, on *Ficus* (leaf), 27-iv-2015, PS.

Diaspididae

12. *Aonidiella aurantii* (Maskell)
**Material examined.** Laos: Attapue, Samakkeexay, 2 ♀, on *Ficus* (leaf), 19-vi-2015, PS; Bolikhamxay, Paksan, 4 ♀, on *Ficus* (leaf), 29-iv-2015, PS; Vientiane Capital, Dansang, 2 ♀, on *Ficus* (leaf), 28-iv-2015, PS; Vientiane Capital, Nalao, 4 ♀, on *Ficus* (leaf), 27-iv-2015, SS; same data, except Vientiane Capital, Sikhottabong, 2 ♀, PS.

13. *Aonidiella inornata* McKenzie
**Material examined.** Cambodia: Stung Treng, 2 ♀, on *Dracaena* (leaf), 20-i-2015, SG. Vietnam: Ho Chi Minh, 2 ♀, on *Ficus* (leaf), 4-iv-2015, SG.

14. *Aspidiotus destructor* Signoret
**Material examined.** Laos: Bolikhamxay, Paksan, 5 ♀, on *Ficus* (leaf), 29-iv-2015, SS.

15. *Chrysomphalus bifasciculatus* Ferris
**Material examined.** Laos: Vientiane Capital, Chanthabouly, 4 ♀, on *Ficus* (leaf), 27-iv-2015, PS; same data, except Vientiane Capital, Sikhottabong, 2 ♀, Vientiane Province, Nalao, 2 ♀, on *Ficus* (leaf), 28-iv-2015, SS.

16. *Chrysomphalus dictyospermi* (Morgan)
**Material examined.** Laos: Vientiane Capital, Saythany, 3 ♀, on *Ficus* (leaf), 27-iv-2015, PS.

17. *Fiorinia coronata* Williams and Watson (Fig. 4)
**Material examined.** Laos: Attapue, Samakkeexay, 9 ♀, on *Ficus* (leaf), 19-vi-2015, PS; Vientiane Capital, Chanthabouly, 4 ♀, on *Dracaena* (leaf), 27-iv-2015, SS. Thailand: Nong Kahi, 1 ♀, on *Ficus* (leaf), 7-i-2015, SG.

18. *Gymnaspis ficus* Ramakrishna Ayyar (Fig. 5)
**Material examined.** Cambodia: Phnom Penh, 6 ♀, on *Ficus* (leaf), 30-iv-2015, SG; same data, except 4 ♀, 28-v-2015.

**Notes.** The material of this species was identified by Dr. Sadao Takagi (Hokkaido University, Japan).
19. *Hemiberlesia palmae* (Cockerell)
Material examined. Laos: Vientiane Province, Viengkham, 5 ♀, on *Ficus* (leaf), 28-iv-2015, PS.

20. *Lepidosaphes chinensis* Chamberlin
Material examined. Laos: Vientiane Province, Viengkham, 5 ♀, on *Ficus* (leaf), 28-iv-2015, PS and SS; same data, except 3 ♀, on *Ficus* (leaf), SS; Vientiane Province, Nalao, 2 ♀, on *Dracaena* (leaf), 28-iv-2015, SS. Thailand: Khon Kaen, 2 ♀, on *Dracaena* (leaf), 6-i-2015, SG.

21. *Lepidosaphes laterochitinosa* Green

22. *Lepidosaphes tokionis* (Kuwana)
Material examined. Laos: Champasak, Pakse, 3 ♀, on *Ficus* (leaf), 17-vi-2015, PS; Vientiane Province, Nalao, 5 ♀, on *Dracaena* (leaf), 28-iv-2015, SS. Thailand: Khon Kaen, 3 ♀, on *Dracaena* (leaf), 6-i-2015, SG.

23. *Lindingaspis rossi* (Maskell)
Material examined. Laos: Vientiane Capital, 2 ♀, on *Ficus* (leaf), 1-v-2015, SS.

24. *Microparlatoria fici* (Takahashi)

25. *Oceanaspidiotus spinosus* (Comstock)
Material examined. Laos: Vientiane Province, Viengkham, 1 ♀, on *Dracaena* (leaf), 28-iv-2015, SS.

26. *Octaspidiotus stauntoniae* (Takahashi)
Material examined. Vietnam: Ho Chi Minh, 3 ♀, on *Ficus* (leaf), 7-iii-2015, SG.

27. *Parlatoria pergandii* Comstock
Material examined. Vietnam: Ho Chi Minh, 3 ♀, on *Ficus* (leaf), 7-iii-2015, SG.

28. *Parlatoria proteus* (Curtis)
Material examined. Laos: Bolikhamsay, Khamkeut, 9 ♀, on *Ficus* (leaf), 30-iv-2015, PS; Vientiane Capital, Chanthabouly, 3 ♀, on *Ficus* (leaf), 27-iv-2015 (SS); same data, except 4 ♀, on *Dracaena* (leaf); Vientiane Province, Nalao, 5 ♀, on *Ficus* (leaf), 27-28-iv-2015, SS and PS. Thailand: Nong Khai, 4 ♀, on *Ficus* (leaf), 7-1-2015, SG.

29. *Pinnaspis buxi* (Bouché)
Material examined. Laos: Vientiane Province, Viengkham, 1 ♀, on *Dracaena* (leaf), 1-v-2015, SS; Vientiane Capital, Sikhottabong, 6 ♀, on *Dracaena* (leaf), 27-iv-2015, PS; Vientiane Province, Viengkham, 1 ♀, on *Ficus* (leaf), 28-iv-2015, PS.
30. *Pseudaonidia trilobitiformis* (Green)  
**Material examined.** Laos: Vientiane Capital, Sikhottabong, 2 ♀, on *Ficus* (leaf), 27-iv-2015, PS.

31. *Pseudaulacaspis cockerelli* (Cooley)  
**Material examined.** Laos: Bolikhamxay, Paksan, 16 ♀, on *Ficus* (leaf), 29-iv-2015, SS and PS; Vientiane Province, Nalao, 3 ♀, on *Dracaena* (leaf), 28-iv-2015, SS. Vietnam: Ho Chi Minh, 11 ♀, on *Dracaena* (leaf), 14-iii-2015, SG.

32. *Pseudaulacaspis pentagona* (Targioni-Tozzetti)  
**Material examined.** Laos: Vientiane Capital, Sikhottabong, 12 ♀, on *Ficus* (twig), 27-iv-2015, PS. Vietnam: Ho Chi Minh, 4 ♀, on *Dracaena* (leaf), 14-iii-2015, SG.

33. *Unaspis acuminata* (Green)  
(Fig. 6)  
**Material examined.** Laos: Bolikhamxay, Khamkeut, 11 ♀, on *Ficus* (leaf), 30-iv-2015, SS and PS; Bolikhamxay, Paksan, 9 ♀, on *Ficus* (leaf), 29-iv-2015, SS and PS; Vientiane Capital, Chanthabouly, 5 ♀, on *Ficus* (leaf), 27-iv-2015, SS and PS; Vientiane Capital, Dansang, 2 ♀, on *Ficus* (leaf), 28-iv-2015, PS; same data, except Vientiane Capital, Naxaythong, 7 ♀; Vientiane Province, Nalao, 3 ♀, on *Ficus* (leaf), 28-iv-2015, PS. Thailand: Nong Kaen, 5 ♀, on *Ficus* (leaf), 6-i-2015, SG.

**Monophlebidae**

34. *Icerya aegyptiaca* (Douglas)  

35. *Icerya seychellarum* (Westwood)  
**Material examined.** Laos: Vientiane Capital, Sikhotabong, 1 ♀, on *Ficus* (leaf), 27-iv-2015, PS.

**Pseudococcidae**

36. *Dysmicoccus neobrevipes* Beardsley  
(Fig. 7)  

37. *Exallomochlus liti* Williams  
**Material examined.** Laos: Vientiane Province, Viengkham, 2 ♀, on *Ficus* (leaf), 28-iv-2015, PS. Vietnam: Ho Chi Minh, 2 ♀, on *Ficus* (twig), 7-iii-2015, SG.

38. *Ferrisia virgata* (Cockerell)  
(Fig. 8)  

39. *Maconellicoccus hirsutus* (Green)  
**Material examined.** Vietnam: Ho Chi Minh, 2 ♀, on *Ficus* (twig), 8-iii-2015, SG.
40. *Nipaecoccus viridis* (Newstead)
**Material examined.** Laos: Vientiane Capital, Sikhottabong, 2 ♀, on *Ficus* (leaf), 27-iv-2015, SS. Vietnam: Ho Chi Minh, 2 ♀, on *Ficus* (leaf), 19-iii-2015, SG.

41. *Paracoccus interceptus* Lit

42. *Phenacoccus solani* Ferris
**Material examined.** Cambodia: Phnom Penh, 2 ♀, on *Dracaena* (leaf), 28-v-2015, SG. Laos: Bolikhamxay, Paksan, 2 ♀, on *Dracaena* (leaf), 29-iv-2015, PS.

43. *Phenacoccus solenopsis* Tinsley
**Material examined.** Laos: Vientiane Capital, Saythany, 2 ♀, on *Ficus* (leaf), 27-iv-2015, PS.

44. *Planococcus minor* (Maskell)
**Material examined.** Laos: Bolikhamxay, Khamkeut, 2 ♀, on *Dracaena* (leaf), 30-iv-2015, SS; Vientiane Capital, Sikhottabong, 2 ♀, on *Dracaena* (leaf), 27-iv-2015, PS; same data, except 2 ♀, on *Ficus* (leaf); Vientiane Province, Nalao, 2 ♀, on *Ficus* (leaf), 28-iv-2015, PS; Xieng Kaung, Paek, 2 ♀, on *Dracaena* (leaf), 15-vii-2015, PS; same locality, 4 ♀, on *Ficus* (leaf, twig), 14-15-vii-2015, PS. Thailand: Khon Kaen, 2 ♀, on *Dracaena* (leaf), 6-i-2015, SG. Vietnam: Ho Chi Minh, 2 ♀, on *Dracaena* (leaf), 7-8-iii-2015, SG.

45. *Pseudococcus baliteus* Lit
**Material examined.** Vietnam: Ho Chi Minh, 1 ♀, on *Dracaena* (leaf), 19-iii-2015, SG.

46. *Pseudococcus cryptus* Hempel
**Material examined.** Thailand: Khon Kaen, Mueang, 2 ♀, on *Ficus* (leaf), 6-i-2015, SG. Vietnam: Ho Chi Minh, 2 ♀, on *Ficus* (leaf), 16-iii-2015, SG; same data, except 1 ♀, 30-iii-2015.

47. *Pseudococcus jackbeardsleyi* Gimpel and Miller

48. *Rastrococcus invadens* Williams
**Material examined.** Laos: Vientiane Province, Viengkham, 1 ♀, on *Ficus* (leaf), 28-iv-2015, PS.

Rhizoeidae

49. *Ripersiella americanus* (Hambleton) (Fig. 9)
**Material examined.** Laos: Vientiane capital, Chanthabouly, 2 ♀, on *Dracaena* (root), 27-iv-2015, SS.

**Discussion**

Forty-nine species of scale insect belonging to 36 genera in six families are recorded from dracaena and ficus plants grown in Cambodia, Laos, Thailand and Vietnam, based on specimens collected during the Laos-Korea collaborative survey in 2015. The following families form the main groups: Diaspididae (22 species), Pseudococcidae (13 species) and Coccidae (10 species). The other scale insect families are each represented by only one or a few species. Of the 49 species, *Ferrisia virgata* (Cockerell), *Plano-
coccus minor (Maskell) and Pseudococcus jackbeardsleyi Gimpel and Miller are common on dracaena and ficus plants. In addition, heavy infestations of some armored scales such as Microparlatoria fici (Takahashi), Parlatoria proteus (Curtis) and Unaspis acuminata (Green) were found on ficus plants.

Twenty-three species (47%) of scale insects found during this survey were intercepted at Korea ports of entry on imported dracaena and ficus plants from southeastern Asia through 1996 to 2014 (PIS 2015). Of the remaining species, 26 are considered as potentially invasive to Korea, although they have not yet been found on plants imported into Korea. The volume and diversity of ornamental plants imported into Korea has increased markedly, and they often harbor scale insects. In addition, the minute size, cryptic behavior and immature stages such as eggs and crawlers of scale insect species infesting leaves and twigs may not be detected during import inspections. It is inevitable that an increase in the international trade of ornamental plants will lead to an increase in the number of potentially invasive species encountered during inspection. Therefore, a faunistic study of scale insects in exporting countries is considered as the most effective approach to block potentially invasive species.

Acknowledgments

We are grateful to Drs. Gregory A. Evans (USDA/APHIS/NIS, Washington, DC, USA) and Ian M. Millar (ARC-Plant Protection Research Institute, Pretoria, South Africa) for their useful editorial contributions to early drafts of this paper. Funding for this project came from QIA (I-1543086-2015-16-01).

Literature Cited


Received September 16, 2015; Accepted October 9, 2015.

Review Editor Aline Barcellos.
Table 1. List of scale insects collected on *Dracaena* and *Ficus* in Cambodia, Laos, Thailand and Vietnam in 2015 [Abbreviations: D, *Dracaena*; F, *Ficus*; IKPE, Interceptions in Korean inspections of imported dracaena or ficus plants from southeastern Asia (1996–2014)].

<table>
<thead>
<tr>
<th>Family</th>
<th>Species</th>
<th>Collection data</th>
<th>IKPE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Cambodia</td>
<td>Laos</td>
</tr>
<tr>
<td>Coccidae</td>
<td>Ceroplastes ceriferus (Fabricius)</td>
<td>D,F</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td>Ceroplastes rubens Maskell</td>
<td>D</td>
<td>F</td>
</tr>
<tr>
<td>Ceroplastes</td>
<td>xishuangensis Tang and Xie</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>Coccos</td>
<td>hesperidum Linnaeus</td>
<td>D</td>
<td>F</td>
</tr>
<tr>
<td>Coccos</td>
<td>viridis (Green)</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>Drepanosohcocc</td>
<td>chilon (Green)</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>Milviscutulus</td>
<td>mangiferae (Green)</td>
<td>D,F</td>
<td>F</td>
</tr>
<tr>
<td>Paralecanium</td>
<td>quadrum (Green)</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>Parasaissetia</td>
<td>nigra (Nieth)</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>Pulvinaria</td>
<td>polygonata Cockerell</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>Conchaspididae</td>
<td>angraecoi Cockerell</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>Diaspididae</td>
<td>Aonidiella auranti (Maskell)</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Aonidiella nomata McKenzie</td>
<td>D</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td>Aspidiotus destructor Signoret</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chrysomphalus bifasciatus Ferris</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chrysomphalus dictyospermi (Morgan)</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>Fiorinia</td>
<td>coronata Williams and Watson</td>
<td>D,F</td>
<td>F</td>
</tr>
<tr>
<td>Gymnosipus</td>
<td>plicatus Ramakrishna Ayavar</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>Hemiiberosia</td>
<td>palmae (Cockerell)</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>Lepidosaphes</td>
<td>chinensis Chamberlin</td>
<td>D,F</td>
<td>F</td>
</tr>
<tr>
<td>Lepidosaphes</td>
<td>laterochitonosa Green</td>
<td>D,F</td>
<td>D</td>
</tr>
<tr>
<td>Lepidosaphes</td>
<td>tokionis (Kuwana)</td>
<td>D,F</td>
<td>D</td>
</tr>
<tr>
<td>Lindingspis</td>
<td>rossii (Maskell)</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>Microparlatoria</td>
<td>fici (Takahashi)</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Oceanaspis spinosus (Comstock)</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>Octaspisoides</td>
<td>stauntoniae (Takahashi)</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>Parlatoria</td>
<td>pergandi Comstock</td>
<td>D,F</td>
<td>F</td>
</tr>
<tr>
<td>Parlatoria</td>
<td>proteus (Curtis)</td>
<td>D,F</td>
<td>F</td>
</tr>
<tr>
<td>Pinnapis</td>
<td>buxi (Bouchê)</td>
<td>D,F</td>
<td>F</td>
</tr>
<tr>
<td>Pseudopinapida</td>
<td>triboliformis (Green)</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>Pseudoleucaspis</td>
<td>cockerelli (Cooley)</td>
<td>D,F</td>
<td>D</td>
</tr>
<tr>
<td>Pseudoleucaspis</td>
<td>pentagona (Targioni-Tozzetti)</td>
<td>F</td>
<td>D</td>
</tr>
<tr>
<td>Unapis</td>
<td>acuminata (Green)</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>Monophlebia</td>
<td>Icerya aegyptiaca (Douglas)</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Icerya seychellarum (Westwood)</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>Pseudococcidae</td>
<td>Dysmicoccus neotrevis Beardsley</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>Exallomochus</td>
<td>liti Williams</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>Ferrisia</td>
<td>virgata (Cockerell)</td>
<td>D,F</td>
<td>D</td>
</tr>
<tr>
<td>Macconellicoccus</td>
<td>hirsutus (Green)</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>Nipaeococcus</td>
<td>viridis (Newstede)</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>Paracoccus</td>
<td>interceptus Lito</td>
<td>F</td>
<td>D,F</td>
</tr>
<tr>
<td>Phenacoccus</td>
<td>solani Ferris</td>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>Phenacoccus</td>
<td>solenopsis Tinsley</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>Planeococcus</td>
<td>minor (Maskell)</td>
<td>D,F</td>
<td>D</td>
</tr>
<tr>
<td>Pseudococcus</td>
<td>tailleus Lito</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>Pseudococcus</td>
<td>crypticus Hempel</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>Pseudococcus</td>
<td>jackbeardsley Gimpel and Miller</td>
<td>F</td>
<td>D,F</td>
</tr>
<tr>
<td>Rastrococcus</td>
<td>invadens Williams</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>Rhizoecidae</td>
<td>Rhizoecus americanus (Hambleton)</td>
<td>D</td>
<td></td>
</tr>
</tbody>
</table>
### Table 2. Number of species (# sp.) and percent of total number of scale insect species (% sp.) collected on dracaena plants in Cambodia, Laos, Thailand and Vietnam (2015) by family and their distribution in southeastern Asia (SA).

<table>
<thead>
<tr>
<th>Distribution in SA</th>
<th>Asterolecaniidae</th>
<th>Cocicidae</th>
<th>Conchaspidae</th>
<th>Diaspididae</th>
<th>Monophlebidae</th>
<th>Ortheziidae</th>
<th>Pseudococcidae</th>
<th>Rhizoecidae</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recorded in SA ( # sp.)</td>
<td>2</td>
<td>11</td>
<td>1</td>
<td>41</td>
<td>1</td>
<td>1</td>
<td>18</td>
<td>3</td>
<td>78</td>
</tr>
<tr>
<td>Total # species collected ( % sp.)</td>
<td>0</td>
<td>5</td>
<td>0</td>
<td>11</td>
<td>1</td>
<td>0</td>
<td>7</td>
<td>1</td>
<td>25</td>
</tr>
</tbody>
</table>

### Table 3. Number of species (# sp.) and percent of total number of scale insect species (% sp.) collected on ficus plants in Cambodia, Laos, Thailand and Vietnam (2015) by family and their distribution in southeastern Asia (SA).

<table>
<thead>
<tr>
<th>Distribution in SA</th>
<th>Asterolecaniidae</th>
<th>Cocicidae</th>
<th>Conchaspidae</th>
<th>Diaspididae</th>
<th>Monophlebidae</th>
<th>Pseudococcidae</th>
<th>Rhizoecidae</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recorded in SA ( # sp.)</td>
<td>2</td>
<td>3</td>
<td>43</td>
<td>1</td>
<td>106</td>
<td>4</td>
<td>0</td>
<td>244</td>
</tr>
<tr>
<td>Total # species collected ( % sp.)</td>
<td>0</td>
<td>0</td>
<td>7</td>
<td>1</td>
<td>21</td>
<td>0</td>
<td>0</td>
<td>42</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Distribution in SA</th>
<th>Kerriidae</th>
<th>Lecanidiidae</th>
<th>Monophlebidae</th>
<th>Pseudococcidae</th>
<th>Rhizoecidae</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recorded in SA ( # sp.)</td>
<td>17</td>
<td>2</td>
<td>11</td>
<td>51</td>
<td>4</td>
<td>244</td>
</tr>
<tr>
<td>Total # species collected ( % sp.)</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>11</td>
<td>0</td>
<td>42</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Distribution in SA</th>
<th>Asterolecaniidae</th>
<th>Cocicidae</th>
<th>Conchaspidae</th>
<th>Diaspididae</th>
<th>Monophlebidae</th>
<th>Ortheziidae</th>
<th>Pseudococcidae</th>
<th>Rhizoecidae</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recorded in SA ( # sp.)</td>
<td>2</td>
<td>11</td>
<td>1</td>
<td>41</td>
<td>1</td>
<td>1</td>
<td>18</td>
<td>3</td>
<td>78</td>
</tr>
<tr>
<td>Total # species collected ( % sp.)</td>
<td>0</td>
<td>5</td>
<td>0</td>
<td>11</td>
<td>1</td>
<td>0</td>
<td>7</td>
<td>1</td>
<td>25</td>
</tr>
</tbody>
</table>