

Scientific Note

Salacia crassifolia (Mart. ex Schult.) G. Don (Celastraceae) as a new host of the green scale insect [*Coccus viridis* (Green, 1889) (Hemiptera: Coccidae)] in the Brazilian Cerrado

Marcelo T. Castro¹, Sandro C. L. Montalvão²

¹Castro Science, Brasília, DF, Brazil. ²Coelho Linhares Treinamento e Desenvolvimento, Brasília, DF, Brazil.

 Corresponding author: marceloengflorestal@gmail.com

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Abstract. The green scale insect, *Coccus viridis* (Green, 1889) (Hemiptera: Coccidae), is reported for the first time infesting *Salacia crassifolia* (Mart. ex Schult.) G. Don (Celastraceae). Infestations of this scale insect were observed on the leaves of an isolated tree located in cerrado *sensu stricto* fragment, near the urban perimeter of Federal District, Brazil. The individuals were concentrated on the central (main) foliar nervure, and ants (Hymenoptera: Formicidae) were observed in association with the coccids in a mutualistic relationship. This work reinforces the polyphagous nature of the species, expanding its geographic distribution in Brazil and increasing the number of known hosts.

Keywords: Forest entomology, phytophagous insects, scale insects.

Cerrado biome is the second largest in area in Brazil, covering about 25% of the national territory, with a great biodiversity and many organisms are considered endemic to this environment (Damasco et al. 2018). Due to its high rate of degradation in recent years, studies on biodiversity aiming at its preservation and conservation are necessary (Strassburg et al. 2017). Cerrado has two well-defined seasons, and the regional climate is classified as AW (tropical climate with rain in summer and drought in winter), in which the rainy season runs from October to April and the drought from May to September (Köppen & Geiger 1928). Recent studies reveal that many plants native from Cerrado are hosts of scale insects (Hemiptera: Coccoomorpha), with new reports of association and possibly new species not yet known to science (Castro et al. 2020; 2022; 2024; 2025; Silva et al. 2021).

Scale insects are phytophagous insects that can be found in association with many families and botanical species (García-Morales et al. 2016). Some species are cosmopolitan, polyphagous and can be found in many countries on different hosts, and others can be specific to a few plants (Grazia et al. 2024). *Salacia crassifolia* (Mart. ex Schult.) G. Don (Celastraceae), popularly known as "bacupari" or "bacupari-do-cerrado" is a shrub species that occurs in the entire Cerrado biome, especially in cerrado *sensu stricto*, and produce fruits appreciated by wildlife and local people (Silva Júnior 2012). Currently, *S. crassifolia* is classified as a vulnerable species by the Brazilian Ministry of the Environment (Brasil 2014). Armored scale insects have been observed frequently in association with *S. crassifolia*, and four species were described in Federal District and Goiás State (Castro et al. 2020; 2025).

In December 2024, infestations of coccids were observed on a single *S. crassifolia* tree located in a cerrado *sensu stricto* fragment, adding *S. crassifolia* as a host that supports feeding and full development. This study documents, for the first time, the occurrence of the green scale *Coccus viridis* (Green, 1889) (Hemiptera: Coccidae) on *S. crassifolia* in the Brazilian Cerrado.

Scale insects associated with *S. crassifolia* were observed in cerrado *sensu stricto* near the urban area in Brasília, Federal District, Brazil (15°44'40.3"S; 47°53'06.4"W). The average temperature in the Federal District in December was 22.1 °C, with a minimum of 18.8 °C and a maximum of 29 °C, with precipitation about 260 mm (<https://portal.inmet.gov.br>).

The *S. crassifolia* tree was analyzed by observing the presence of the scale insects on the leaves, stems, flowers and fruits. The plant

was identified using the manual elaborated by Silva Júnior (2012). The injuries caused by the scale insects were observed during the collections on the evaluated plants, observing the main alterations caused by the coccids and the presence of other insects. Plants of other species around *S. crassifolia* were also analyzed, investigating the occurrence of scale insects. Specimens were identified using the genus and species description by Hodgson (1994), Granara de Willink (1999); Granara de Willink et al. (2010) based on morphological characters.

The scale insect found on *S. crassifolia* leaves was identified as *C. viridis*, popularly known as soft green scale or green scale (Fig. 1). The individuals were concentrated on the central (main) foliar nervure (Fig. 1A and 1B), and ants (Hymenoptera: Formicidae) were observed in association with the coccids in a mutualistic relationship, as observed by Bach (1991), characterized as an ant-tended agricultural pest (Jha et al. 2009). The individuals presented a transparent light green body, 2 to 3 mm long, usually with a "U" or "V" shaped spot made up of black dots in the center of the dorso (Fig. 1C). The main damage caused by this insect results from intense suction of phloem, causing chlorosis and leaf yellowish. At high population levels, defoliation may occur (Mau & Kessing 2007). Additionally, sooty mold (Capnodiales) may develop on the upper leaf surface, reducing photosynthetic rates (Chomnunti et al. 2014).

Coccidae is an important family of Coccoidea superfamily, with 180 genus and 1240 species described (García-Morales et al. 2016). *Ceroplastes* Gray, 1828 and *Coccus* Linnaeus, 1758 are the largest genus of Coccidae, with 144 and 114 species, respectively. *Coccus hesperidum* Linnaeus, 1758 and *C. viridis* are generalist species that are frequently found in association with many types of plants, frequently causing injuries and economic damage (Fernandes et al. 2009). This coccid occurs with major frequency in rainy periods in Rondônia, Brazil (November to February) (Costa et al. 2009).

Coccus viridis is a cosmopolitan scale insect probably native from Brazil that occurs in 119 countries, 66 hosts families, and 167 botanical genera around the world (Mau & Kessing 2007; García-Morales et al. 2016). Celastraceae family has already been reported as host of the green scale on *Maytenus* sp. in Portugal (Vieira et al. 1983), and on *Schaefferia frutescens* in Itabo, Cuba (Mestre Novoa et al. 2015). In Brazil, *C. viridis* was reported in 15 states, from North to South of the country, infesting more than 25 botanical species in 14 families (Tab. 1).

Green scale is reported as an important and invasive pest of some



Figure 1. *Coccus viridis* (Green, 1889) (Hemiptera: Coccidae) on *Salacia crassifolia* (Mart. ex Schult.) G. Don (Celastraceae) leaf in Federal District, Brazil. A) General view of the *S. crassifolia* tree infested with scale insects. B) Scale insects observed on the central (main) nervure. C) Detail of the green scale on the nervure.

Table 1. Host status and occurrence of *Coccus viridis* (Green, 1889) (Hemiptera: Coccidae) in Brazil.

Host(s)	Family	State	Region	Reference(s)
<i>Coffea canephora</i> Pierre ex Froehner, <i>Citrus</i> spp.	Rubiaceae, Rutaceae	Acre	North	Thomazini et al. (2005); Santos et al. (2023)
<i>Citrus</i> spp.	Rutaceae	Amapá	North	Silva & Jordão (2005)
<i>Citrus</i> spp.	Rutaceae	Amazonas	North	Almeida et al. (2018)
<i>Theobroma cacao</i> L.	Malvaceae	Bahia	Northeast	Silva (1950)
<i>Coffea arabica</i> L., <i>Coffea canephora</i> , <i>Murraya paniculata</i> (L.) Jack	Rubiaceae, Rutaceae	Espírito Santo	Southeast	Culik et al. (2007); Fornazier et al. (2017)
<i>Hancornia speciosa</i> Gomes	Apocynaceae	Goiás	Midwest	Silva et al. (2021)
<i>Coffea arabica</i>	Rubiaceae	Minas Gerais	Southeast	Fernandes et al. (2009); Fornazier et al. (2017)
<i>Coffea</i> spp., <i>Myrciaria dubia</i> H. B. K. Mc Waugh	Myrtaceae, Rutaceae	Pará	North	Lemos et al. (2008)
<i>Malpighia glabra</i> L.	Malpighiaceae	Paraná	South	Albuquerque et al. (2002)
<i>Coffea</i> spp.	Rubiaceae	Rio Grande do Norte	Northeast	Fornazier et al. (2017); Kondo et al. (2022)
<i>Coffea arabica</i>	Rubiaceae	Rio Grande do Sul	South	Granara de Willink et al. (2010)
<i>Begonia</i> sp., <i>Buxus sempervirens</i> L., <i>Carica papaya</i> L., <i>Citrus reticulata</i> Blanco, <i>Citrus sinensis</i> (L.) Osbeck, <i>Coffea arabica</i> , <i>Duranta erecta</i> L., <i>Eugenia sprengelii</i> DC., <i>Gardenia jasminoides</i> J.Ellis, <i>Ixora chinensis</i> Lam., <i>Ixora coccinea</i> L., <i>Ixora macrothyrsa</i> (Teijsm. & Binn.) T.Moore, <i>Mangifera indica</i> L., <i>Manilkara zapota</i> (L.) P. Royen, <i>Musa</i> sp., <i>Pouteria caimito</i> (Ruiz & Pav.) Radlk., <i>Psidium araca</i> Sabine, <i>Psidium guajava</i> L., <i>Schinus terebinthifolia</i> Raddi, <i>Triplaris</i> sp.	Anacardiaceae, Begoniaceae, Buxaceae, Caricaceae, Musaceae, Myrtaceae, Polygonaceae, Rubiaceae, Rutaceae, Sapotaceae, Verbenaceae	Rio de Janeiro	Southeast	Trindade (2011)
<i>Coffea</i> spp.	Rubiaceae	Rondônia	North	Costa et al. (2009)
<i>Citrus</i> spp.	Rutaceae	Santa Catarina	South	Brugnara et al. (2022)
<i>Citrus</i> spp., <i>Coffea canephora</i>	Rubiaceae, Rutaceae	São Paulo	Southeast	Almeida et al. (2018); Souza et al. (2023)

important crops, like coffee (*Coffea* spp., Rubiaceae), mango (*Mangifera indica* L., Anacardiaceae), cassava (*Carica papaya* L., Caricaceae), guava (*Psidium guajava* L., Myrtaceae), *Citrus* spp. (Rutaceae), and many other fruit and ornamental plants (Mau & Kessing 2007; Fernandes et al. 2009; Wyckhuys et al. 2013; García-Morales et al. 2016; Fornazier et al. 2017; Almeida et al. 2018). This scale insect has previously been reported for its high reproduction capacity (parthenogenetic), ability to colonize different habitats, and to infest many hosts (Malumphy & Treseder 2012).

This work expands the *C. viridis* occurrence to Federal District, and adds a new species as host, *S. crassifolia*, a Cerrado native plant, reinforcing the polyphagous and cosmopolitan habit of this coccid. As it is a scale insect species with a high reproductive capacity and great potential to cause damage and losses in various crops of agronomic and forestry interest, this new report reinforces the importance of conducting studies on the pest-host relationship and proposing measures aimed at the conservation of species that are potentially vulnerable and at risk of extinction.

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Authors' Contributions

MTC: Investigation, Methodology, Project administration, Supervision, Writing – original draft, Writing – review & editing; SCLM: Formal analysis, Investigation; Writing – original draft, Writing – review & editing.

Conflict of Interest Statement

The authors declare that there is no conflict of interest.

References

- Albuquerque, F. A.; Pattaro, F. C.; Borges, L. M.; Lima, R. S.; Zabini, A. V. (2002) Insetos associados à cultura da aceroleira (*Malpighia glabra* L.) na região de Maringá, Estado do Paraná. *Acta Scientiarum*, 24(5): 1245-1249. doi: [10.4025/actasciagron.v24i0.2273](https://doi.org/10.4025/actasciagron.v24i0.2273)
- Almeida, L. F. V.; Peronti, A. L. B. G.; Martinelli, N. M.; Wolff, V. R. S. (2018) A survey of scale insects (Hemiptera: Coccoidea) in citrus orchards in São Paulo, Brazil. *Florida Entomologist*, 101(3): 353-363. doi: [10.1653/024.101.0324](https://doi.org/10.1653/024.101.0324)
- Bach, C. E. (1991) Direct and indirect interactions between ants (*Pheidole megacephala*), scales (*Coccus viridis*) and plants (*Pluchea indica*). *Oecologia*, 87: 233-239. doi: [10.1007/BF00325261](https://doi.org/10.1007/BF00325261)
- Brasil (2014) Ministério do Meio Ambiente. Lista Nacional Oficial de Espécies da Flora Ameaçadas de Extinção. Portaria MMA nº 443, de 17 de dezembro de 2014. https://dados.gov.br/dados/conjuntos-dados/portaria_443
- Brugnara, E. C.; Castilhos, R. V.; Sabião, R. R. (2022) Consequências da seca no Oeste Catarinense para a cultura dos citros na safra 2020/21. *Agropecuária Catarinense*, 35(2): 11-13. doi: [10.52945/rac.v35i2.1231](https://doi.org/10.52945/rac.v35i2.1231)
- Castro, M. T.; Montalvão, S. C. L.; Wolff, V. R. S.; Monnerat, R. G. (2020) First association of scale insects (Hemiptera: Diaspididae) with *Salacia crassifolia* (Mart. Ex Schult.) G. Don. (Celastraceae). *Insecta Mundi*, 0774: 1-5.
- Castro, M. T.; Montalvão, S. C. L.; Wolff, V. R. S. (2022) First report of *Umbaspis regularis* (Newstead, 1911) (Hemiptera: Diaspididae) associated with *Agonandra brasiliensis* Miers ex Benth. & Hook.f. (Opiliaceae) in the Brazilian Cerrado. *Entomological Communications*, 4: ec04033. doi: [10.37486/2675-1305.ec04033](https://doi.org/10.37486/2675-1305.ec04033)
- Castro, M. T.; Montalvão, S. C. L.; Wolff, V. R. S. (2024) First report of *Acutaspis oliveirai* (Lepage & Giannotti, 1942) (Hemiptera: Diaspididae) in Central Brazil: occurrence on *Myrsine guianensis* (Aubl.) Kuntze (Primulaceae) in the Brazilian Cerrado. *Entomological Communications*, 6: ec06037. doi: [10.37486/2675-1305.ec06037](https://doi.org/10.37486/2675-1305.ec06037)
- Castro, M. T.; Montalvão, S. C. L.; Wolff, V. R. S. (2025) *Salacia crassifolia* (Celastraceae) as a host of armored scale insects (Hemiptera: Diaspididae): two new reports and expansion of occurrence in Brazil. *Brazilian Journal of Biology*, 85: e292233. doi: [10.1590/1519-6984.292233](https://doi.org/10.1590/1519-6984.292233)
- Chomnunti, P.; Hongsanan, S.; Aguirre-Hudson, B.; Tian, Q.; Persoh, D.; Dhami, M. K.; Alias, A. S.; Xu, J. C.; Liu, X. Z.; Stadler, M., et al. (2014) The sooty moulds. *Fungal Diversity*, 66(1): 1-36. doi: [10.1007/s13225-014-0278-5](https://doi.org/10.1007/s13225-014-0278-5)
- Costa, J. N. M.; Teixeira, C. A. D.; Sallet, L. A. P.; Gama, F. de C. (2009) Cochonilhas ocorrentes em cafezais de Rondônia. Embrapa, Rondônia, Circular Técnica n. 110.
- Culik, M. P.; Martins, D. S.; Ventura, J. A.; Peronti, A. L. B. G.; Gulla, P. J.; Kondo, T. (2007) Coccidae, Pseudococcidae, Ortheziidae, e Monophlebidae (Hemiptera: Coccoidea) do Espírito Santo, Brasil. *Biota Neotropica*, 7(3): 61-65. doi: [10.1590/S1676-06032007000300006](https://doi.org/10.1590/S1676-06032007000300006)
- Damasco, G.; Fontes, C.; Franço, R.; Haidar, R. (2018) The Cerrado Biome: a Forgotten Biodiversity Hotspot. *Frontiers for Young Minds*, 6(22): 1-9. doi: [10.3389/frym.2018.00022](https://doi.org/10.3389/frym.2018.00022)
- Fernandes, F. L.; Picanço, M. C.; Fernandes, M. E.; Galdino, T. V.; Tomaz, A. C. (2009) Perdas causadas por *Coccus viridis* (Hemiptera: Coccidae) em mudas de *Coffea arabica* L. *EntomoBrasilis*, 2(2): 49-53. doi: [10.12741/entomobrasilis.v2i2.43](https://doi.org/10.12741/entomobrasilis.v2i2.43)
- Fornazier, M. J.; Martins, D. S.; Granara de Willink, M. C.; Pirovani, V. D.; Ferreira, P. S. Zanuncio, J. C. (2017) Scale insects (Hemiptera: Coccoidea) associated with arabica coffee and geographical distribution in the neotropical region. *Anais da Academia Brasileira de Ciências*, 89(4): 3083-3092. doi: [10.1590/0001-3765201720160689](https://doi.org/10.1590/0001-3765201720160689)
- García-Morales, M.; Denno, B. D.; Miller, D. R.; Miller, G. L.; Ben-Dov, Y.; Hardy, N. B. (2016) ScaleNet: A literature-based model of scale insect biology and systematics. *Database*, 2016: bav118. doi: [10.1093/database/bav118](https://doi.org/10.1093/database/bav118)
- Granara de Willink, M. C. (1999) Las cochinillas blandas de la República Argentina (Homoptera: Coccoidea: Coccidae). *Contributions on Entomology*, 3(1):1-183.
- Granara de Willink, M. C.; Pirovani, V. D.; Ferreira, P. S. F. (2010) Las Especies de *Coccus* que Afectan *Coffea arabica* en Brasil (Coccoidea: Coccidae) y Redescrición de Dos Especies. *Neotropical Entomology*, 39(3): 391-399. doi: [10.1590/S1519-566X2010000300013](https://doi.org/10.1590/S1519-566X2010000300013)
- Grazia, J.; Takiya, D. M.; Wolff, V. R. S.; Schwertner, C. F.; Mejdalani, G.; Cavichioli, R. R.; Peronti, A. L. B. G.; Queiroz, D. L.; Burckhardt, D.; Fernandes, J. A. M., et al. (2024) Hemiptera Linnaeus, 1758. In: Rafael, J. A.; Melo, G. A. R.; Carvalho, C. J. B. de; Casari, S.; Constantino, R. (Eds.), *Insetos do Brasil: Diversidade e Taxonomia*, Cap. 25, pp. 368-456. 2ª ed. Instituto Nacional de Pesquisas da Amazônia, Manaus. doi: [10.61818/56330464c25](https://doi.org/10.61818/56330464c25)
- Hodgson, C. J. (1994) The scale insect family Coccidae: an identification manual to genera. CAB. International, Wallingford, Oxon, U.K.
- Jha, S.; Vandermeer, J. H.; Perfecto, I. (2009) Population dynamics of *Coccus viridis*, a ubiquitous ant-tended agricultural pest, assessed by a new photographic method. *Bulletin of Insectology*, 62 (2): 183-189.
- Köppen, W.; Geiger, R. (1928) *Klimate der Erde*. Gotha: Verlag Justus Perthes.
- Kondo, T.; Watson, G. W.; Gavrilov-Zimin, I. A. (2022) *Coccus* L. Encyclopedia of Scale Insect Pests. CABI Wallingford, Oxfordshire, UK.
- Lemos, W. de P.; Ribeiro, R. C.; Azevedo, R. de (2008) Principais insetos-praga em cafeeiros no Estado do Pará. In: Veloso, C. A. C.; Viégas, I.

- de J. M.; Carvalho, E. J. M. (Eds.), *A cultura do cafeeiro no Pará*, pp. 149-173. Embrapa Amazônia Oriental, Belém, PA.
- Mau, R. F. L.; Kessing, J. L. M. (2007) *Coccus viridis* (Green), UH-CTAHR Integrated Pest Management Program. http://www.extento.hawaii.edu/kbase/crop/type/c_viridi.htm. Access on: 27.xii.2024.
- Malumphy, C.; Treseder, K. (2012) Green coffee scale *Coccus viridis* (Hemiptera: Coccidae), new to Britain. *British Journal of Entomology and Natural History*, 25: 217-225.
- Mestre Novoa, N.; Hodges, G. S.; Guajardo, V.; Kondo, T.; Oliver, P. H.; Herrera, M. C. M.; Marrero, A. H. (2015) Insectos escama (Hemiptera: Sternorrhyncha: Coccoidea) del Parque Natural Topes de Collantes, Sancti-Spíritus, Cuba y la relación con sus plantas hospedantes. *Insecta Mundi*, 0426: 1-27.
- Santos, R. S.; Costa, V. L.; Silva, V. V. L.; Souza, G. N. (2023) Ocorrência da cochonilha verde (Hemiptera: Coccidae) em cafezais (var. Conilon) no Estado do Acre. *Agrotrópica*, 35(1): 97-100.
- Silva, P. (1950) The Coccids of Cacao in Bahia, Brazil. *Bulletin of Entomological Research*, 41(1): 119-120. doi: [10.1017/S0007485300027516](https://doi.org/10.1017/S0007485300027516)
- Silva, R. A.; Jordão, A. L. (2005) Pragas dos citros no Estado do Amapá. *Revista Científica Eletrônica de Agronomia*, 4(7): 1-4.
- Silva Júnior, M. C. da (2012) 100 árvores do cerrado: sentido restrito: guia de campo Brasília, DF: Rede de Sementes do Cerrado.
- Silva, J. F.; Pereira, J. M.; Rocha, C. B. S.; Peres, A. J. A. (2021) Primeiro registro de *Parasaissetia nigra* e hemípteros associados às variedades de mangabeira *Hancornia speciosa*. *Ciência Florestal*, 31(4): 2023-2034. doi: [10.5902/1980509848381](https://doi.org/10.5902/1980509848381)
- Souza, I. L.; de Paulo, H. H.; de Siqueira, M. A.; Costa, V. A.; Wengrat, A. P. G. S.; Peronti, A. L. B. G.; Martinelli, N. M. (2023) Scale Insects and Natural Enemies Associated with Conilon Coffee (*Coffea canephora*) in São Paulo State, Brazil. *Agriculture*, 13(4): 829. doi: [10.3390/agriculture13040829](https://doi.org/10.3390/agriculture13040829)
- Strassburg, B. B. N.; Brooks, T.; Feltran-Barbieri, R.; Iribarrem, A.; Crouzeilles, R.; Loyola, R.; Latawiec, A. E.; Oliveira-Filho, F. J. B.; Scaramuzza, C. A. D. M.; Scarano, F. R., et al. (2017) Moment of truth for the Cerrado hotspot. *Nature Ecology & Evolution*, 1(4): 1-3. doi: [10.1038/s41559-017-0099](https://doi.org/10.1038/s41559-017-0099)
- Thomazini, M. J.; Oliveira, T. K. de; Albuquerque, E. S. de; Lessa, L. S.; Cavalcante, M. de J. B. (2005) Identificação de pragas e doenças e avaliação de variedades copa/porta-enxerto de citros no estado do Acre. *Boletim de Pesquisa e Desenvolvimento*, 43. Embrapa Acre: Rio Branco.
- Trindade, T. D. (2011) Nova contribuição sobre distribuição e novos hospedeiros de *Coccus viridis* Green, 1889 (Hemiptera: Coccidae) no estado do Rio de Janeiro, Brasil. *Entomotropica*, 26(3): 147-152.
- Vieira, R. M. S.; Carmona, M. M.; Pita, M. S. (1983) Sobre os coccídeos do Arquipélago da Madeira (Homoptera - Coccoidea). *Boletim do Museu Municipal do Funchal*, 35: 81-162.
- Wyckhuys, K. A. G.; Kondo, T.; Herrera, B. V.; Miller, D. R.; Naranjo, N.; Hyman, G. (2013) Invasion of exotic arthropods in South America's biodiversity hotspots and agro-production systems. In: Peña, J. E. (Ed.), *Potential Invasive Pests*, pp. 373-400. Wallingford: CAB International.