

## Scientific Note

# First report of *Umbaspis regularis* (Newstead, 1911) (Hemiptera: Diaspididae) associated with *Agonandra brasiliensis* Miers ex Benth. & Hook.f. (Opiliaceae) in the Brazilian Cerrado

Marcelo T. de Castro<sup>1✉</sup>, Sandro C. L. Montalvão<sup>2</sup>, Vera Regina S. Wolff<sup>3</sup>

<sup>1</sup>Centro Universitário ICESP de Brasília, DF, Brazil. <sup>2</sup>Embrapa Recursos Genéticos e Biotecnologia, DF, Brazil. <sup>3</sup>Secretaria Estadual de Agricultura, Pecuária e Desenvolvimento Rural, RS, Brazil.

✉ Corresponding author: [marceloengflorestal@gmail.com](mailto:marceloengflorestal@gmail.com)

Edited by: Ivan Carlos F. Martins<sup>id</sup>

Received: May 07, 2022. Accepted: August 23, 2022. Published: September 30, 2022.

**Abstract.** *Agonandra brasiliensis* Miers ex Benth. & Hook.f. (Opiliaceae), is a tree species of the Brazilian Cerrado used for wood and medicinal purposes by the local population. Studies about insects associated with *A. brasiliensis* are inexistent and there is no report of scale insects association with this tree species. This study aimed to report for the first time the occurrence of *Umbaspis regularis* (Newstead, 1911) (Hemiptera: Diaspididae) on *A. brasiliensis* in Brasília, Distrito Federal, Brazil. This is also the first report of this scale insect in Central Brazil. Additionally, macroscopic and microscopic descriptions of *U. regularis* and the injuries observed in the plants are presented.

**Keywords:** Forest Entomology, Phytophagous Insect, Scale Insect.

The Brazilian Cerrado is composed of hundreds of endemic plant species with high environmental, social, and economic interest. Currently, this biome suffers from a high loss of biodiversity due to the accentuated anthropic action, including agricultural activities and disorderly land occupation (Ganem et al. 2013). Protective measures should be prioritized, as many animals and plants species are considered exclusive to this biome (Klink & Machado 2005; Damasco et al. 2018).

Opiliaceae is a Pantropical botanical family composed of trees, shrubs and lianas (Elias et al. 2002; Groppo Jr. & Pirani 2003). In Brazil, within this family, only the tropical genus *Agonandra* is known, comprising eight species of trees and shrubs (Groppo Jr. & Pirani 2003), distributed over a large part of the national territory. In the Cerrado, *Agonandra brasiliensis* Miers ex Benth. & Hook.f., popularly known as “pau-marfim” or “cerveja-de-pobre”, is a common tree species and the most well distributed species of this genus, occurring in the Federal District and in the states of Acre, Amazonas, Bahia, Ceará, Espírito Santo, Goiás, Maranhão, Mato Grosso, Mato Grosso do Sul, Pará, Piauí, Rondônia, Roraima, São Paulo and Tocantins (Silva Júnior 2005).

According to Marquete (2005), *A. brasiliensis* produces wood used for various purposes, such as joinery, carpentry and firewood, and the bark that covers the trunk and branches is used for cork. In addition, a regional drink known for having diuretic properties is made from its bark and roots (Silva Júnior 2005), the seeds are used as healing agents (Camargos et al. 2001) and the leaves and bark have antifungal properties (Goulart et al. 2013).

Insects have great ecological and economic importance, being able to maintain harmonious or disharmonious relationships with plants (Fujihara et al. 2016). The order Hemiptera is home to sucking insects, including scale insects, aphids, bugs, cicadas, leafhoppers, whiteflies, and psyllids. Scale insects (Hemiptera: Coccoomorpha) are heterogeneous and diverse insects and are exclusively phytophagous, which may vary, depending on the species, with respect to the specificity of the host plant (Grazia et al. 2012). Studies on the entomofauna associated with *A. brasiliensis* are lacking and there are no reports of scale insects associated with this species so far (García Morales et al. 2016).

This study aimed to report for the first time the occurrence of a scale insect of the Diaspididae family in trees of *A. brasiliensis* located in Brasília, Distrito Federal, Brazil, as well as to characterize the main injuries caused to plants by this insect.

Scale insects samples were collected on *A. brasiliensis* trees between January and March 2020 and from October to December 2021 in an area of Cerrado sensu stricto in the municipality of Brasília, Distrito Federal, Brazil (15°74'39.6" S; 47°88'51.6" W), close to the urban area.

Adult females were fixed in 70% alcohol and subsequently prepared on permanent slides for microscopic identification. Slides were prepared according to the methodology proposed by Wolff et al. (2014) and identified using Newstead's description (1911) and MacGillivray's key and description (1921). The injuries caused by the scale insects on the trees of *A. brasiliensis* were observed during the months of study in the evaluated plants, observing the main alterations caused by the insects, especially in the leaves. The macroscopic images were obtained using a Sony® digital camera and the microscopic images with a digital camera attached to a Zeiss 3.0 microscope.

Voucher specimens were deposited in the Collection of “Ramiro Gomes Costa Museum of Entomology (MRGC), State Secretariat for Agriculture, Livestock, and Rural Development, Rio Grande do Sul (DDPA, SEAPDR, RS)”. Insect collections were authorized by the Chico Mendes Institute for Biodiversity Conservation, Brazil, under number 57418-4.

The scale insect was identified as *Umbaspis regularis* (Newstead, 1911) (Hemiptera: Diaspididae) (Fig. 1). There were more than 200 females on some leaves, with chlorotic spots on the leaves, with a deformed/wrinkled appearance (Figs. 1A, B). Adult females were mainly in the adaxial part of the leaves (Fig. 1C) and males in the abaxial part (Fig. 1D).

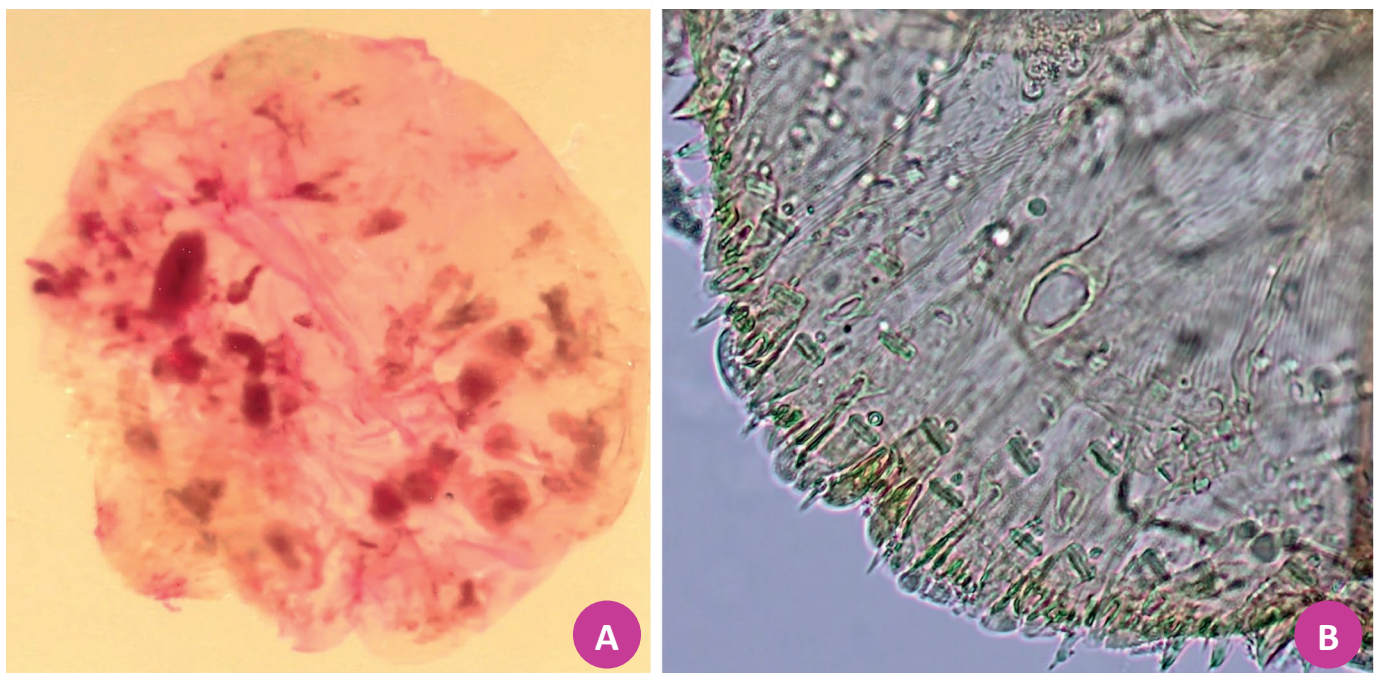
Regarding the macroscopic characters, the adult female is protected under a white-matte circular shield, with 1.5 mm in diameter and two central brown exuvia, associated with the presence of chlorotic spots around the shield (Fig. 1C). The male, in the pre-pupal and pupal stages, is protected by a three-cornered, white wax shield with a yellow exuvia at the apical end (Fig. 1D).



**Figure 1.** *Umbaspis regularis* on *Agonandra brasiliensis* in Brasília, Distrito Federal, Brazil. A) Tree with leaves infested by *U. regularis*. B) Adaxial part of the leaf with *U. regularis*. C) Shield of an adult female. D) Male shields.

Microscopically, the adult female has a subcircular body and a rounded cephalothoracic region. In the posterior region of the body, the pygidium (Fig. 2), on the margin, presents the first pair of lobes (L1) well developed, divergent, with the inner margins finely serrated and the outer margins joined to the pygidial margin, the second and third pairs (L2 and L3) bilobed and similar, the fourth pair (L4) formed by a simple, long lobe with a slightly serrated edge; at the margin of the fourth abdominal segment a robust spur, in the form of

a sclerotized spine; simple glandular spines longer than the pygidial lobes: 1 between L1 and L2, 1 between L2 and L3, 1 between L3 and L4, 2 between L4 and the sclerotized spine and more than 10 after this spine to the II abdominal segment; marginal macroconducts with oval opening: 1 between L1, 1 between L1 and L2, 2 between L2 and L3, 2 between L3 and L4, 1 after L4, close to the sclerotized spine; submarginal macroconducts: 2 on each side over L2 and L3; numerous microconducts distributed from the first abdominal segments to the



**Figure 2.** Microscopic characters of the adult female of *Umbaspis regularis*. A) Subcircular body (5x objective). B) Pygidium margin with L1 divergent, L2 and L3 bilobed, L4 simple and serrated, marginal macroconducts between the lobes (40x objective).

VII segment and the presence of five groups of circumgenital glands.

The genus *Umbaspis* MacGillivray (1921) has two valid species and the type species *Diaspis regularis* Newstead, by monotypy and original designation accepted valid name. In addition to this species there are *Umbaspis spatulata* (Hall, 1929), both described in Africa (Balachowsky 1954; García Morales et al. 2016).

Fonseca (1969) reports in São Paulo, in an unknown native host, the subspecies *brasiliensis* close to *U. regularis* and *U. spatulata*, from which it differs by the presence of a marked depression in the anterior cephalothoracic margin, by the occurrence of 8 to 13 glands. anterior parastigmatic lesions and the presence of 23 to 25 microconducts on the first pregidial segment. In the examined specimens referring to the first scale insect observed in this study, the characters described by Fonseca (1969) were not observed. Therefore, the scale insect studied in the present work was classified as *U. regularis*.

*Umbaspis regularis* has a wide distribution in Africa with introduction in Italy and Poland in *Ananas* sp. (Pellizzari & Dalla Montà 1997; Danzig & Pellizzari 1998). According to García Morales et al. (2016), *U. regularis* occurs in Arecaceae (*Chamaerops* sp.), Bromeliaceae (*Ananas* sp.), Fabaceae (*Daniellia oliveri* (Rolfe) Hutch. & Dalziel) and Meliaceae (*Khaya senegalensis* (Desr.) A.Juss.). So far, only two scale insects have been found on plants of the Opiliaceae family, *Ceroplastes formicarius* Hempel, 1900 (Hemiptera: Coccidae) and *Milviscutulus mangiferae* (Green, 1889) (Hemiptera: Coccidae) (García Morales et al. 2016). Therefore, this is the first record of the occurrence of *U. regularis* in a member of the Opiliaceae family and the first report of this scale insect for the central region of Brazil.

Scale insects are important plant-sucking insects that can cause huge economic losses (Fujihara et al. 2016). In the Brazilian Cerrado region, few studies have been carried out to catalog the scale insect species that occur associated with native plants of this biome. Recent works such as that of Castro et al. (2020), show new records of interactions so far unknown to science. This work exalts the richness of scale insect species of the Cerrado biome, where many associations between insects and plants are still unknown and must be researched and cataloged.

The scale insect *U. regularis* is reported for the first time in *A. brasiliensis* trees causing leaf deformations and chlorosis. Additionally, this is the first report of the occurrence of this scale insect in central Brazil.

## Authors' Contributions

MTC: Performed the material collection and analysis; wrote the manuscript, SCLM: Performed the material collection and analysis; wrote the manuscript, VRSW: Identified the scale insect species and contributed to the interpretation of the results; wrote the manuscript.

## Conflict of Interest Statement

The authors declare no conflicts of interest.

## References

- Balachowsky, A. S. (1954) *Les cochenilles Paléarctiques de la tribu des Diaspidini*. Memmoires Scientifiques de l'Institut Pasteur Paris.
- Camargos, J. A. A.; Coradin, V. T. R.; Czarneski, C. M.; Oliveira, D.; Meguerditchian, I. (2001) *Catálogo de Árvores do Brasil*. Laboratório de Produtos Florestais. Brasília. Ed. IBAMA.
- Castro, M. T.; Montalvão, S. C. L.; Wolff, V. R. dos S.; Monnerat, R. G. (2020) First association of scale insects (Hemiptera: Diaspididae) with *Salacia crassifolia* (Mart. Ex Schult.) G. Don. (Celastraceae). *Insecta Mundi*, 774: 1-5.
- Damasco, G.; Fontes, C.; Françoso, R; Haidar, R. (2018) The Cerrado Biome: a Forgotten Biodiversity Hotspot. *Front Young Minds*, 6: 22. doi: [10.3389/frym.2018.00022](https://doi.org/10.3389/frym.2018.00022)
- Danzig, E. M.; Pellizzari, G. (1998) Diaspididae. *Catalogue of Palaearctic Coccoidea*. Plant Protection Institute, Hungarian Academy of Sciences Budapest, Hungary.
- Elias, S. I.; Souza, V. C.; Rodrigues, R. R. (2002) Opiliaceae In: Wanderley, M. G. L.; Shepherd, G. J.; Giulletti, A. M.; Melhem, T. S.; Bittrich, V.; Kameyama, C. (Eds.), *Flora Fanerogâmica do Estado de São Paulo*. Vol. 2, p. 219-222. Instituto de Botânica, São Paulo.
- Fonseca, J. P. (1969) Contribuição ao conhecimento dos coccídeos do Brasil (Homoptera - Coccoidea). *Arquivos do Instituto Biológico*, 36(1): 9-40.
- Fujihara, R. T.; Forti, L. C.; Almeida, M. C.; Baldin, E. L. L. (2016) *Insetos de importância econômica: guia ilustrado para identificação de famílias*. Botucatu: FEPAF.
- Ganem, R. S.; Drummond, J. A.; Franco, J. L. de A. (2013) Conservation policies and control of habitat fragmentation in the Brazilian Cerrado biome. *Ambiente & Sociedade*, 16(3): 99-118. doi: [10.1590/S1414-753X2013000300007](https://doi.org/10.1590/S1414-753X2013000300007)
- 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*. doi: [10.1093/database/bav118](https://doi.org/10.1093/database/bav118)
- Goulart, L. S.; Teles, H. L.; Mendes, V. A.; Vieira, M. C. S.; Moura, S. V.; Ramon, J. L.; Souza, J. M.; Vieira, J. C. S.; Campos, E. P. (2013) Prospecção antifúngica em *Agonandra brasiliensis*. *Revista Brasileira de Farmácia*, 94(3): 289-294.
- Grazia, J.; Cavichioli, R. R.; Wolff, V. R. S.; Fernandes, J. A. M.; Takiya, D. M. (2012) Hemiptera Linnaeus, 1758. In: Rafael, J. A.; Melo, G. A. R.; Carvalho, C. J. B.; Casari, S. A.; Constantino, R. (Org.), *Insetos do Brasil: Diversidade e Taxonomia*. 1ed. Ribeirão Preto: Holos.
- Gropo Junior, M.; Pirani, J. (2003) Flora da Serra do Cipó, Minas Gerais: Opiliaceae. *Boletim de Botânica*, 21(2): 279-281. doi: [10.11606/issn.2316-9052.v21i2p279-281](https://doi.org/10.11606/issn.2316-9052.v21i2p279-281)
- Klink, C. A.; Machado, R. B. (2005) A conservação do Cerrado brasileiro. In: Megadiversidade. Desafios e oportunidades para a conservação da biodiversidade no Brasil, pp. 147-155, Belo Horizonte: Conservação Internacional.
- MacGillivray, A. D. (1921) *The Coccidae. Tables for the Identification of the Subfamilies and Some of the More Important Genera and Species, together with Discussions of their Anatomy and Life History*. Scarab Urbana, Ill..
- Marquete, R. (2005) Reserva Ecológica do IBGE - Opiliaceae. *Rodriguésia*, 56(87): 133-139. doi: [10.1590/2175-78602005568710](https://doi.org/10.1590/2175-78602005568710)
- Newstead, R. (1911) Observations on African scale insects (Coccidae). *Bulletin of Entomological Research*, 2(3): 85-104.
- Pellizzari, G.; Dalla Montà, L. D. (1997) 1945-1995: Fifty years of incidental insect pest introduction to Italy. *Acta Phytopathologica et Entomologica Hungarica*, 32: 171-183.
- Silva Júnior, M. C. (2005) *100 árvores do cerrado: guia de campo*. Brasília, DF: Rede de Sementes do Cerrado.
- Wolff, V. R. S; Botton, M.; Silva, D. C. (2014) Diaspidídeos e parasitoides associados ao cultivo da videira no Rio Grande do Sul, Brasil. *Revista Brasileira de Fruticultura*, 36(4): 835-840. doi: [10.1590/0100-2945-145/13](https://doi.org/10.1590/0100-2945-145/13)