Pesquisa Florestal Brasileira
http://pfb.sede.embrapa.br/pfb/

e-ISSN: 1983-2605

Review articles

Correcting the record: insects of African mahogany (*Khaya* spp.) in Brazilian plantations

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Index terms:
Insect pests
Species misidentification
Hypsipyla grandella

Termos para indexação:
Praga florestal
Identificação equivocada
Hypsipyla grandella

Received in 02/07/2025
Technical approval in 23/09/2025
Final approval in 15/10/2025
Published in 30/10/2025

Abstract - The interaction between exotic African mahogany species (*Khaya* spp.) and their associated insects in Brazilian plantations holds scientific and economic significance, and Brazil hosts one of the largest cultivated areas of these trees worldwide. The most widely planted species in the country, *Khaya grandifoliola*, has often been misidentified as *Khaya ivorensis*, causing confusion in the literature and compromising entomological research and pest management efforts. We also found several misidentifications of associated insects in the literature, further complicating the understanding of these interactions. While studies typically focus on the mahogany shoot borer (*Hypsipyla grandella*), records of numerous other insects reported by growers remain unpublished or are linked to incorrect tree species names. This reveals a critical knowledge gap, with few studies accurately documenting insect occurrences or confirming their pest status. This review article compiles and analyzes the current literature on insects associated with African mahogany in Brazil, contributing to the taxonomic and ecological understanding of these interactions. The findings provide a foundation for sustainable plantation management and improved pest management, offering guidance to researchers and producers involved in African mahogany cultivation.

Corrigindo equívocos: insetos em plantios de mogno africano (*Khaya* spp.) no Brasil

Resumo - A interação entre espécies exóticas de mogno-africano (*Khaya* spp.) e insetos associados aos plantios no Brasil tem relevância científica e econômica, especialmente porque o país abriga uma das maiores áreas plantadas dessa árvore no mundo. A espécie mais cultivada no Brasil é *Khaya grandifoliola*, frequentemente identificada erroneamente como *Khaya ivorensis*, o que tem gerado confusões na literatura científica e comprometido estudos entomológicos e estratégias de manejo integrado de pragas. Além disso, há várias literaturas sobre insetos associados ao mogno africano que foram identificados errados, complicando ainda mais a compreensão dessas interações. Embora a literatura enfatize a broca-das-meliáceas (*Hypsipyla grandella*), outros insetos relatados por produtores permanecem sem publicação ou são associados a nomes incorretos das espécies de *Khaya*. Essa situação revela uma lacuna crítica no conhecimento, com poucos estudos documentando adequadamente a ocorrência de insetos ou confirmando seu status como pragas economicamente relevantes. Este artigo de revisão reúne e analisa a literatura disponível sobre insetos associados ao mogno-africano no Brasil, contribuindo para o entendimento taxonômico e ecológico dessas interações. Os resultados oferecem subsídios essenciais para o manejo sustentável dos plantios e aprimoramento no manejo de pragas, além de orientar pesquisadores e produtores envolvidos com o cultivo da espécie.

https://doi.org/10.4336/2025.pfb.45e202502338

Introduction

African mahogany (Meliaceae: *Khaya* A. Juss) comprises a group of African-origin species valued for their high-quality timber and significant economic importance (Bouka et al., 2019; International Tropical Timber Organization, 2023). There are eight known *Khaya* species, *K. agboensis* A. Chev., *K. anthotheca* (Welw.) C.DC., *K. euryphylla* Harms, *K. grandifoliola* C.DC., *K. ivorensis* A. Chev., *K. madagascariensis* Jum. & H. Perrier, *K. nyasica* Stapf ex Baker f., and *K. senegalensis* (Desr.) A. Juss. (Bouka et al., 2022). Beyond economic value, mahogany plantations play crucial roles in carbon storage, nutrient cycling, and conservation (Caldeira et al., 2023; Gomes et al., 2024).

The introduction of African mahogany (*Khaya* spp.) to Brazil dates back to the 1970s, with the first recorded introduction occurring at Brazilian Agricultural Research Corporation (Embrapa Amazônia Oriental) in Belém, in the state of Pará (Falesi & Baena, 1999). Initially, the introduced species was misidentified as *K. ivorensis* (Falesi & Baena, 1999). However, later studies confirmed that it was actually *K. grandifoliola* (ABPMA, 2020; Ferraz Filho et al., 2021). Seeds from these trees were distributed to producers by Embrapa, but some growers appear to have also independently imported seeds (Falesi & Baena, 1999). As a result, the exact timeline and pathways of *Khaya* species introductions into Brazil remain uncertain. This taxonomic misidentification has led to persistent confusion in the literature, particularly in entomological studies (Falesi & Baena, 1999; Lunz et al., 2008; Farias et al., 2011; Matrangolo et al., 2016; Nascimento et al., 2016; Ceu et al., 2017; Moura et al., 2017; Silva et al., 2017, 2020, 2022; Zanetti et al., 2017; Fialho Júnior et al., 2019; Lemes et al., 2019), where incorrect species identification makes it difficult to ascertain the accuracy of reports on insect-plant interactions.

The introduction of African mahogany species in Brazil was primarily driven by economic incentives, as these trees produce high-value timber with strong market potential. Additionally, the adaptability of *Khaya* species to diverse Brazilian climatic and edaphic conditions, excluding areas with frost or severe water deficits, further facilitated their expansion (Oliveira & Franca, 2020). African mahogany also emerged as a viable alternative to native Brazilian mahogany (*Swietenia macrophylla* King), which faces logging restrictions due to its endangered status in Brazil (CITES, 2024). Moreover, the monoculture of *S. macrophylla* is unfeasible due to severe infestations by the shoot borer *Hypsipyla grandella* (Zeller) (Lepidoptera: Pyralidae) (Ohashi et al., 2008). Initially, it was believed that, being an exotic species, African mahogany might exhibit some level of resistance to shoot borer attacks, making it an attractive substitute for the native species (Falesi & Baena, 1999).

The 2010s marked a significant boom in African mahogany plantations in Brazil leading to a substantial increase in cultivated areas (Taguchi, 2013). A 2021 survey estimated that approximately 50,000 ha were planted with African mahogany in Brazil, with *K. grandifoliola* representing 66% of the total area and *K. senegalensis* another 33% (Ferraz Filho et al., 2021). These two species are currently the most relevant for commercial forestry in Brazil (Reis et al., 2019). Other species, such as *K. anthotheca* and *K. ivorensis*, are also cultivated, but on a much smaller scale. African mahogany plantations are primarily concentrated in the Southeast (50%), followed by the Mid-West (25%), North (13%), Northeast (6%), and South (6%) regions (Ferraz Filho et al., 2021). Most stands are less than 10 years old, reflecting the species' relatively recent expansion in the country.

Although recently introduced in Brazil, African mahogany has gained commercial relevance, yet scientific research remains limited and largely restricted to conference proceedings and technical reports. Furthermore, initial misidentification of the most planted species as *K. ivorensis* instead of *K. grandifoliola* has led to persistent confusion in the literature, particularly in entomological studies, where it compromises the accuracy of insect association records.

With that scenario in mind, we thus aimed to analyze the existing scientific literature (articles, books, thesis, dissertations, and conference proceedings) on insects associated with African mahogany (*Khaya* spp.) in Brazil. The objectives included: (1) identifying the insect orders and species reported, (2) determining the most studied *Khaya* species and evaluating the insect-affected plant parts, (3) quantifying the available publications and ways of publications, (4) examining cases of *Khaya* misidentification before and after correction clarification, and (5) map the geographic distribution of study locations.

Preference and associated species of Khaya spp. in Brazil

The term "*agricultural pest*" refers to organisms (insects, nematodes, mites, etc.) that cause damage to plants, resulting in economic losses for humans (Hill, 1997). An analysis of publications on insects in African mahogany reveals that most species described as "*pests*" should instead be classified as insects associated with the crop, based on this concept. While the majority of the publications describe damage to different plant parts, this damage is rarely quantified. Therefore, the more accurate term would be *associated insects*, with some potentially becoming pests of African mahogany.

The literature reports 80 insect species and two mite species associated with African mahogany in Brazil (Table 1). Regarding the insects, 62 species belong to the order Coleoptera (77.5%), seven species to Lepidoptera (8.8%), five species to Hymenoptera (6.3%), five species to Hemiptera (three in Sternorryncha, and two in Auchenorrhyncha), and one species to Orthoptera (1.3%). The two mite species belong to the family Tetranychidae.

At least 35% of the reviewed literature does not clearly indicate whether the insect species associated with African mahogany were identified by trained taxonomists or whether the authorship included specialists in the relevant taxonomic groups. This omission raises the possibility of misidentifications. For instance, Pinto (2020) reported the occurrence of *Xylothrips* sp., an exotic beetle not previously recorded in Brazil. However, upon direct inquiry, the author disclosed that the identifications were based solely on photographic comparisons from online sources. Given the potential implications of this uncertain record, the author kindly provided one of us (CAHF) with Bostrichidae specimens collected in *Khaya* wood used in the study. Upon examination, none of the specimens were *Xylothrips*; they were identified as *Xylionulus transvena* (Lesne) and *X. picea*, both of which may resemble *Xylothrips* to researchers without taxonomic training. Similarly, Falesi & Baena (1999) referred to a beetle boring into petioles as *Xyleborus* (misspelled as "*Xyleboros*") or *Xylosandrus* (misspelled as "*Xylosandros*"). Based on our experience, only *Hypothenemus* spp. and *Xylosandrus compactus* bore into petioles in Brazil (unpublished data), and inexperienced researchers might confuse one for the other. A comparable issue appears in Gonçalves et al. (2023), who reported *X. compactus* attacking petioles but included photographs that clearly depicted *Hypothenemus*, leaving the actual identity of the reported species uncertain. These examples underscore the need for insect identifications to be confirmed by qualified taxonomists - particularly for ecologically and economically significant species - to ensure the reliability of records and the validity of ecological and management-related inferences.

The most frequently attacked part of the tree was the trunk, followed by branches and leaves (Table 1). African mahogany contains toxic secondary compounds, which are more concentrated in the leaves than in the trunk (Paritala et al., 2015). This may explain the higher number of insect species associated with trunks and branches compared to leaves.

Among insects, Coleoptera and Lepidoptera are particularly important in forestry due to the high number of phytophagous species (Frost, 1954). The order Lepidoptera plays a significant role in the forestry sector due to its presence across a wide range of forest crops in Brazil (Kowalczuck et al., 2012). Lepidoptera presence is easily spotted due to the visible defoliation their caterpillars inflict to leaves. However, so far only two defoliator species have been reported in the two most commonly planted African mahogany species in Brazil, *K. grandifoliola* and *K. senegalensis* (Covre et al., 2025a), and only recently. Lepidoptera represent only 8.8% of all insect records in African mahogany plantations. Notably, most Lepidoptera species in these systems are associated with damage to trunks, seeds, and shoots or tips, rather than leaf defoliation (Table 1). However, we were made aware of a report of leaf damage on five-year-old *K. grandifoliola* trees in Ipueiras, state of Tocantins, caused by caterpillars of *Acharia* sp. (Limacodidae) (personal communication, Rodrigo Rafael de Deus Machado, 2025).

Although some insects, such as leaf-cutting ants and termites (Lemes & Zanuncio, 2021), are commonly found in forest plantations, there are few studies addressing these insects in African mahogany plantations in Brazil (Table 1). However, it is known that these insects are frequent in Brazilian African mahogany plantations, and the lack of studies may be explained by the fact that growers are already familiar with these pests and routinely incorporate their control into plantation management practices.

In Coleoptera, the families Bostrichidae, Cerambycidae, Curculionidae sensu stricto (*note: these represent the 'former' Curculionidae, excluding Scolytinae), and Scolytinae (Curculionidae sensu

lato) are of forestry importance, primarily due to their association with wood (Penteado et al., 2009). As a matter of fact, these families have been prominent in studies of insects associated with African mahogany in Brazil. Scolytinae alone accounts for the majority of the reports (59.7%), followed by Bostrichidae (17.7%), Curculionidae: Platypodinae (9.7%), Curculionidae: Entiminae (4.8%), Cerambycidae (4.8%) and Anthribidae (3.2%) (Table 1).

The most frequently reported species include *Euplatypus parallelus* (Fabricius) (Coleoptera: Curculionidae: Platypodinae), *Hypsipyla grandella* (Zeller) (Lepidoptera: Pyralidae), and *Xyloperthella picea* (Olivier) (Coleoptera: Bostrichidae) (Table 1).

Euplatypus parallelus (Figure 1) is a Neotropical species and it is considered one of the most widespread and destructive Platypodinae in the world (Wood & Bright, 1992). It is a polyphagous beetle that attacks standing trees, logs, or freshly cut wood (Beaver, 2013). This beetle is commonly found in most African mahogany plantations in Brazil and has been reported attacking standing trees, logs, and freshly cut branches. However, there are no published studies quantifying the damage caused by this insect in the crop. Cristovam et al. (2018) associated its attack with the thinning of *K. grandifoliola* trees, but did not provide any damage quantification or control recommendations, especially since the publication is an abstract from a scientific meeting, which limits the level of detail regarding the occurrence of this insect in the crop. Similarly, Covre et al. (2018c) mention that this species is related to pruning activities, and recommend the prompt removal of pruned branches to avoid trunk infestation by wood-boring beetles, including *E. parallelus*. Nevertheless, only infestation percentages were reported, and the trees were able to defend themselves against the borers through gum exudation. Therefore, it remains uncertain whether such attacks may impact the future quantity or quality of the wood.

Hypsipyla grandella (Figure 2B) is a moth native to South and Central America, commonly known as the shoot borer or mahogany shoot borer, and it is a major pest of cedars (*Cedrela* spp.) and mahoganies (*Swietenia* spp.) (Griffiths, 2001). In Brazil, this species is a significant pest of Brazilian mahogany, and it has been observed attacking seeds, bark, and shoot tips of African mahogany. This moth has been reported to damage seeds of *K. grandifoliola* (Lemes et al., 2019). However, the authors did not perform any quantitative or qualitative assessment of the seeds, such as seed weight or germination tests; they only documented the occurrence and included photographs of the damage. Based on this, the insect should be regarded as a potential pest, particularly when seed-based propagation is used by producers for seedling production.

Reports of *H. grandella* attacking shoot tips (Figures 2A and 2C) indicated low infestation levels, approximately 3% in *K. grandifoliola* (Zanetti et al., 2017). Damage has only been described for *K. senegalensis*, although infestation levels were not quantified (Queiroga et al., 2023). These studies report the occurrence of the insect and discuss possible impacts of the damage and control measures, drawing from literature on *H. grandella* damage in Brazilian mahogany (*S. macrophylla*). Therefore, it remains uncertain whether African mahogany trees affected by this insect will suffer any future economic impact in wood quality or commercial value. Moreover, *K. grandifoliola* appears to be less susceptible to shoot borer attack than *K. ivorensis* (Santos, 2019; Ferraz Filho et al., 2021).

Hypsipyla grandella has also been reported, at low infestation levels (around 1% of trees), attacking the base of the trunk of *K. senegalensis* (Figure 3A) (Covre et al., 2018d; Dallacort et al., 2018), and appears to be associated with bark canker in *K. grandifoliola* (Covre et al., 2018d). However, no economic damage has been quantified and no control methods have been studied (Figure 3B) (Covre et al., 2018d).

Xyloperthella picea (Figure 4) is native to the African continent (Madagascar), and Arabia (Borowski & Wegrzynowicz, 2007). Although the exact date of its introduction to Brazil is uncertain, it likely occurred during the transatlantic slave trade (Lesne, 1903). This beetle is usually associated with dry wood (Kahuthia-Gathu et al., 2018), and as suggested by reports of other species within the same genus and tribe exhibiting similar behavior (Fisher, 1950; Roberts, 1967). However, in Brazilian African mahogany plantations, it has been reported infesting even trunks of apparently healthy tree, a behavior that is rather unusual for this species. Nevertheless, the extent of its damage was not quantified (Covre et al., 2018b). Despite the lack of detailed assessments, *X. picea* can be considered a potential pest of African mahogany, particularly in sawmills.

Table 1. Orders, families, and species of insects and mites associated with African mahogany (*Khaya* spp.) in Brazil, and respective plant parts attacked (PPA) , and their respective literature references.

Order	Family	Species	PPA	References
COL	Anthribidae	*Phaenithon curvipes* (Germar)*	TR	Ceu et al. (2017)
COL		*Phaenithon semigriseus* (Germar)*	TR	Ceu et al. (2017)
COL	Bostrichidae	*Apate terebrans* (Pallas)	TR	Matrangolo et al. (2016); Covre et al. (2018a); Luna et al. (2018)
COL		*Dominikia uncinata* (Germar)	TR	Silva et al. (2017); Covre et al. (2018b); Benso (2019)
COL		*Micrapate brasiliensis* (Lesne)	TR	Silva et al. (2017)
COL		*Micrapate germaini* (Lesne)	TR	Ceu et al. (2017); Covre et al. (2018b)
COL		*Micrapate quadraticollis* (Lesne)*	TR	Silva et al. (2017)
COL		*Micrapate* sp.*	TR	Ceu et al. (2017)
COL		*Minthea squamigera* Pascoe*	SW	Pinto (2020)
COL		*Sinoxylodes curtulus* (Erichson)	TR	Benso (2019)
COL		*Tetrapriocera longicornis* (Olivier)	TR	Ceu et al. (2017)
COL		*Xyloperthella picea* (Olivier)	BR, TR	Ceu et al. (2017); Silva et al. (2017); Covre et al. (2018b, 2018c); Benso (2019)
COL		*Xylothrips* sp.?	SW	Pinto (2020)
COL	Cerambycidae	*Chlorida festiva* (Linnaeus)	TR	Ceu et al. (2017)
COL		*Neoclytus pusillus* (Castelnau & Gory)	TR	Ceu et al. (2017)
COL		*Trachyderes succintus* (Linnaeus)	TR, BR	Ceu et al. (2017); Fujihara et al. (2021)
COL	Curculionidae: Entiminae	*Zygops mexicanus* Boheman*	TR	Ceu et al. (2017)
COL		*Zygops* sp.*	TR	Ceu et al. (2017)
COL		*Naupactus optatus* (Herbst)	LE, BR, RO	Silva et al. (2022)
COL	Curculionidae: Platypodinae	*Euplatypus parallelus* (Fabricius)	BR, TR	Ceu et al. (2017); Silva et al. (2017); Covre et al. (2018b, 2018c); Cristovam et al. (2018); Pelozato et al. (2018); Benso (2019)
COL		*Euplatypus segnis* (Chapuis)	TR	Silva et al. (2017); Benso (2019)
COL		*Megaplatypus dentatus* (Dalman)	TR	Benso (2019)
COL		*Megaplatypus mutatus* (Chapuis)	TR	Silva et al. (2017); Covre et al. (2025b)
COL		*Megaplatypus olivieri* (Chapuis)	TR	Silva et al. (2017)
COL		*Teloplatypus ratzeburgi* (Chapuis)	BR	Covre et al. (2018c)
COL	Curculionidae: Scolytinae	*Ambrosiodmus obliquus* (LeConte)	TR	Benso (2019)
COL		*Ambrosiodmus* hagedorni (Iglesias)*	TR	Benso (2019)
COL		*Cnestus retifer* (Wood)	TR	Ceu et al. (2017)
COL		*Cnestus retusus* (Eichhoff)	BR, TR	Covre et al. (2018c); Benso (2019)

Order	Family	Species	PPA	References
COL		*Coptoborus semicostatus* (Schedl)*	BR	Covre et al. (2018c)
COL		*Coptoborus vespatorius* (Schedl)	BR	Benso (2019)
COL		*Coptoborus villosulus* (Blandford)	TR, BR	Benso (2019)
COL		*Corthylus antennarius* Schedl	TR	Benso (2019)
COL		*Corthylus pharax* Schedl	BR, TR	Silva et al. (2017); Covre et al. (2018c); Benso (2019)
COL		*Corthylus theobromae* Nunberg	TR	Benso (2019)
COL		*Cryptocarenus heveae* (Hagedorn)	TR	Benso (2019)
COL		*Dryocoetoides cristatus* (Fabricius)	BR, TR	Silva et al. (2017); Benso (2019)
COL		*Hylocurus dimorphus* (Schedl)	TR	Covre et al. (2018b)
COL		*Hypothenemus bolivianus* (Eggers)	TR	Benso (2019)
COL		*Hypothenemus eruditus* Westwood	BR, TR	Silva et al. (2017); Covre et al. (2018c); Benso (2019)
COL		*Hypothenemus obscurus* (Fabricius)	TR	Ceu et al. (2017); Benso (2019)
COL		*Hypothenemus opacus* (Eichhoff)	TR	Benso (2019)
COL	Curculionidae: Scolytinae	*Hypothenemus plumeriae* (Nordlinger)	TR	Ceu et al. (2017)
COL		*Hypothenemus setosus* (Eichhoff)	TR	Benso (2019)
COL		*Microcorthylus minimus* Schedl	BR	Silva et al. (2017); Covre et al. (2018c)
COL		*Microcorthylus quadridens* Wood	TR	Silva et al. (2017); Benso (2019)
COL		*Microcorthylus ?parvidus**	TR	Silva et al. (2017)
COL		*Premnobius ambitiosus* (Schaufuss)	TR	Silva et al. (2017)
COL		*Premnobius cavipennis* Eichhoff	BR, TR	Silva et al. (2017); Covre et al. (2018c); Benso (2019)
COL		*Sampsonius dampfi* Schedl	TR	Silva et al. (2017); Benso (2019)
COL		*Sampsonius pedrosai* Schönherr	TR	Benso (2019)
COL		*Scolytopsis toba* Wichmann	TR	Silva et al. (2017)
COL		*Xyleborinus linearicollis* (Schedl)	BR, TR	Ceu et al. (2017); Covre et al. (2018c)
COL		*Xyleborinus reconditus* (Schedl)	TR	Silva et al. (2017)
COL		*Xyleborus* or *Xylosandrus* sp.?	PE	Falesi & Baena (1999)
COL		*Xyleborus affinis* Eichhoff	BR, TR	Ceu et al. (2017); Benso (2019)
COL		*Xyleborus ferox* Blandford	TR	Silva et al. (2017)
COL		*Xyleborus ferrugineus* (Fabricius)	TR	Benso (2019)
COL		*Xyleborus spinulosus* Blandford	BR, TR	Silva et al. (2017); Covre et al. (2018c); Benso (2019)

Order	Family	Species	PPA	References
COL		*Xyleborus squamulatus* Eichhoff	BR, TR	Silva et al. (2017); Covre et al. (2018c)
COL		*Xylosandrus compactus* (Eichhoff)?	PE, ST	Gonçalves et al. (2023)
COL		*Xylosandrus crassiusculus* (Motschulsky)	TR	Covre et al. (2021)
HEM	Aleyrodidae	*Aleurocanthus woglumi* Ashby	LE	Farias et al. (2011)
HEM	Coccidae	*Parasaissetia nigra* (Nietner)	LE, PE, BR, TR	Fialho Júnior et al. (2019); Silva et al. (2024)
HEM	Lecanodiaspididae	*Lecanodiaspis dendrobii* Douglas	TR, BR	Silva et al. (2024)
HEM	Cicadidae	*Dorisiana noriegai* Sanborn & Heath	RO	Covre et al. (2025c)
HEM		*Taphura maccagnani* Sanborn	RO	Covre et al. (2025c)
HYM	Apidae	*Trigona spinipes* Fabricius	ST	Moura et al. (2017)
HYM		*Trigona* sp.	ST	Falesi & Baena (1999)
HYM	Formicidae	*Atta laevigata* Smith	LE	Souza et al. (2021)
HYM		*Atta sexdens rubropilosa* Forel	LE	Texeira et al. (2018)
HYM		*Atta* sp.*	LE	Bonfim et al. (2022)
LEP	Apatelodidae	*Apatelodes pandara* Druce	LE	Covre et al. (2025a)
LEP	Cosmopterygidae	*Pyroderces rileyi* (Walsingham)	TR	Covre et al. (2018d)
LEP	Geometridae	*Glena bipennaria bipennaria* (Guenée)	TR	Covre et al. (2025a)
LEP	Limacodidae	*Acharia* sp.	LE	Machado (2025)
LEP	Pyralidae	*Caphys biliniata* (Stoll)	TR	Covre et al. (2018d)
LEP		*Ectomyelois muriscis* (Dyar)	TR	Covre et al. (2018d); Coelho et al. (2021)
LEP		*Hypsipyla grandella* (Zeller)	TR, LE, SE, ST	Zanetti et al. (2017); Covre et al. (2018d); Dallacortet et al. (2018); Lemes et al. (2019); Santos (2019); Queiroga et al. (2023)
ORT	Acrididae	*Stenopola bohlsii* Giglio-Tos	LE	Lunz et al. (2008)
TRO	Tetranychidae	*Mononychellus* sp.	LE	Nascimento et al. (2016)
TRO		*Oligonychus* sp.	LE	Nascimento et al. (2016)

*Taxonomic identification refined by the authors after publication of the original source; ?questionable determination. COL: Coleoptera; HEM: Hemiptera; HYM: Hymenoptera; LEP: Lepidoptera; ORT: Orthoptera; and mites: TRO: Trombidiformes; BR = branches; FR = fruits; LE = leaves; PE = petioles; RO = roots; SE = seeds; SW = sawn wood; ST= shoot tips; TR = trunks.

Photos: Luana de Souza Covre.

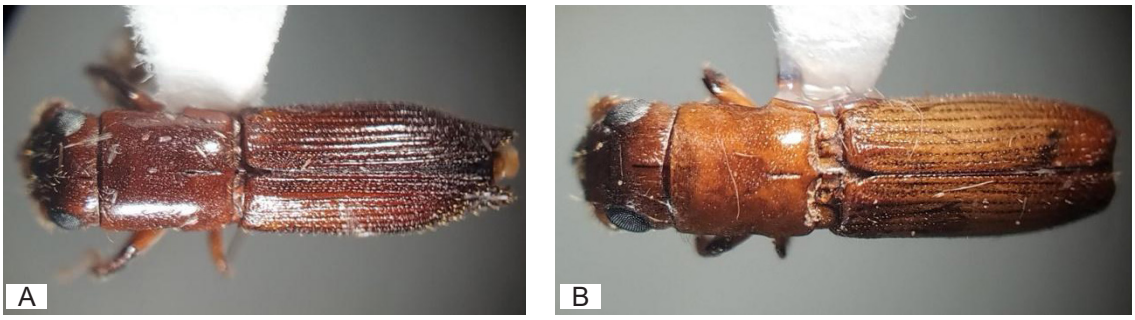

Figure 1. *Euplatypus parallelus* (Fabricius) (Coleoptera: Curculionidae: Platypodinae), male (A) and female (B).

Photos: Luana de Souza Covre.

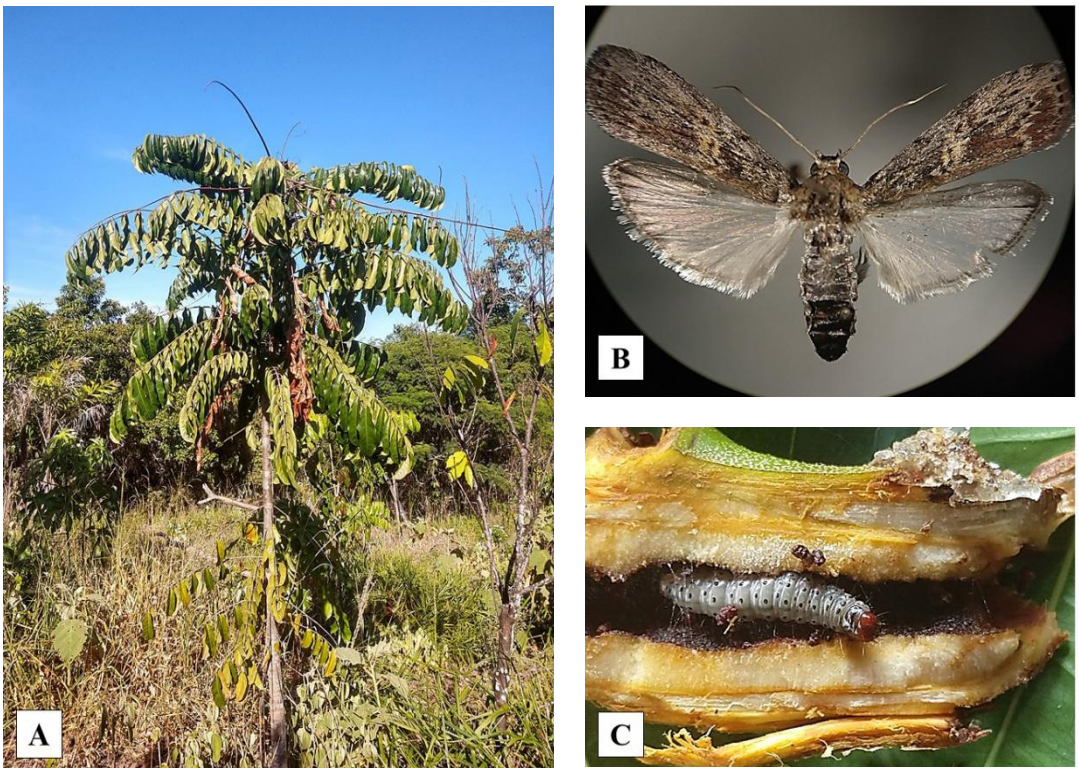

Figure 2. A) Damage to the shoot tip of *Khaya ivorensis*; B) adult and C) larva of *Hypsipyla grandella* (Zeller) (Lepidoptera: Pyralidae) in Valença, Bahia State, Brazil.

Photos: Luana de Souza Covre.

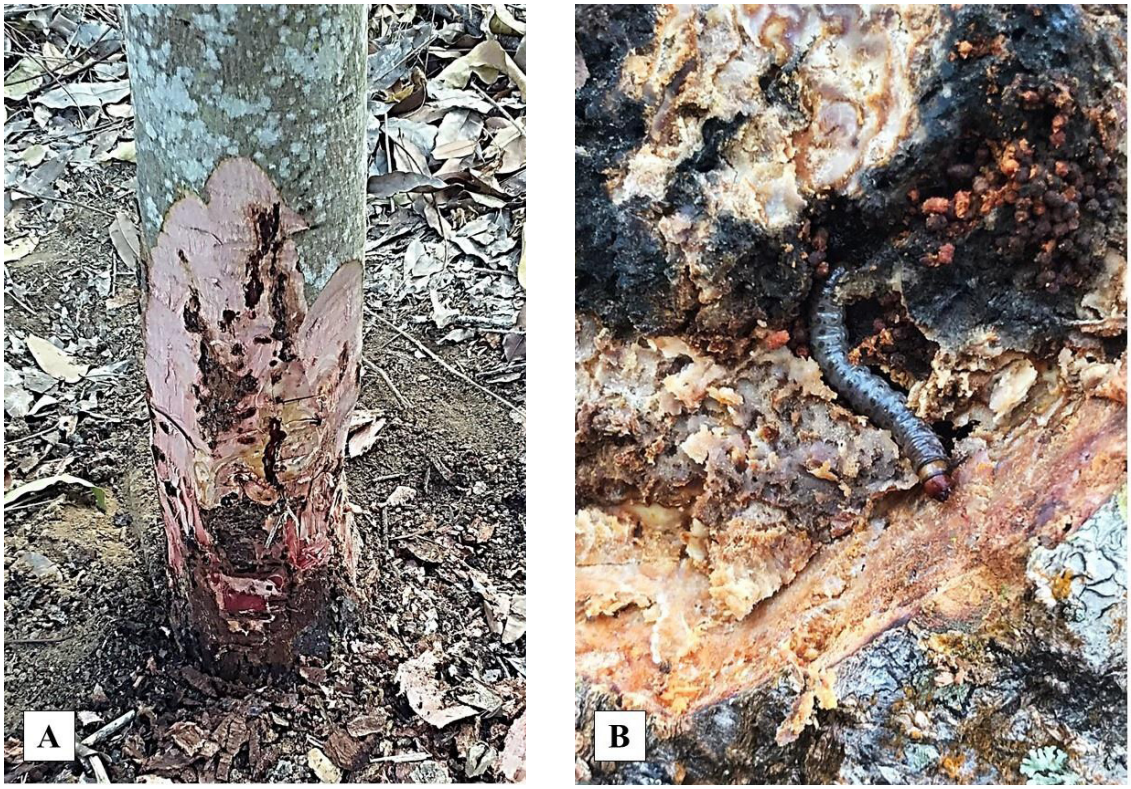

Figure 3. A) Damage caused by *Hypsipyla grandella* (Zeller) (Lepidoptera: Pyralidae) at the base of the trunk of *Khaya senegalensis* in Alpercata, Minas Gerais State, Brazil; and B) larva associated with bark canker on *Khaya grandifoliola* in São Roque de Minas, Minas Gerais State, Brazil.

Photos: Luana de Souza Covre.

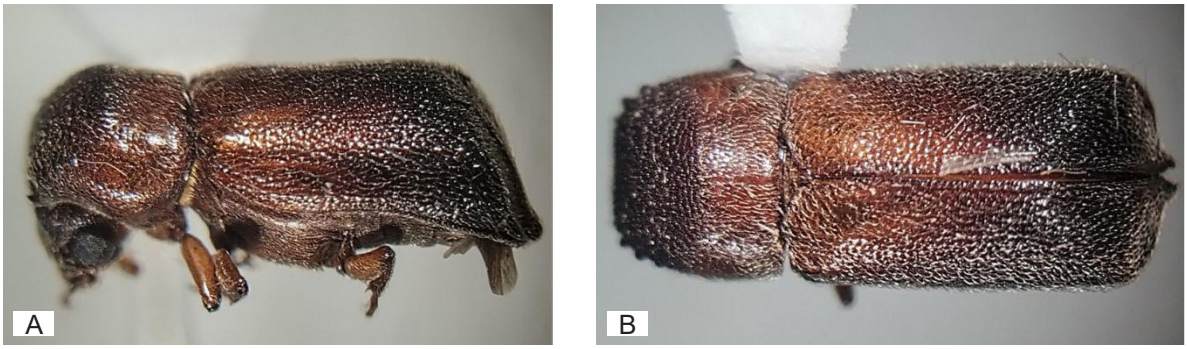

Figure 4. *Xyloperthella picea* (Olivier) (Coleoptera: Bostrichidae), lateral view (A) and dorsal view (B).

Literature on insects associated with African mahogany in Brazil

In our literature review, we found 36 publications on insects associated with African mahogany in Brazil, including two books, 16 peer-reviewed journal articles, 14 conference abstracts, and four theses/dissertations.

There are two additional books mentioning insects associated with African mahogany in Brazil (Pinheiro et al., 2011; Reis et al., 2019), but these were not included in our stats, as they primarily consist of literature reviews that cite previously published studies without presenting new data. Conference abstracts, theses, or dissertations that had subsequently been published as scientific articles were excluded from the literature census to ensure that the same insect records were not counted more than once.

The number of insect occurrence records we compiled from the reviewed publications was 14 for *K. grandifoliola*, 15 for *K. ivorensis*, and 12 for *K. senegalensis* (Table 2), with species names reproduced exactly as they appeared in the original studies. However, based on the geographic locations mentioned in these studies and the photographic documentation of insect damage provided in the methodology, we identified cases of misidentification between *K. grandifoliola* and *K. ivorensis*. Among the studies citing *K. ivorensis*, only that of Santos (2019) actually involved this species, while the remaining 14 studies were, in fact, conducted on *K. grandifoliola* (Table 2). It is worth mentioning that two articles (Fujihara et al., 2021; Silva et al., 2022) continued to use the incorrect species name *K. ivorensis* despite the official taxonomic clarification of African mahogany species provided by Associação Brasileira dos Produtores de Mogno Africano (2020).

After these corrections, it becomes evident that *K. grandifoliola* is the most frequently studied African mahogany species in insect occurrence reports in Brazil (68.3%), followed by *K. senegalensis* (29.3%), and *K. ivorensis* (2.4%) (Table 2). These figures closely mirror the proportion of plantation area occupied by each species, with *K. grandifoliola* covering ca. 66% of the total planted area and *K. senegalensis* about 33%, while *K. ivorensis* is limited to small experimental plots (Ferraz Filho et al., 2021).

Geographically, most records come from Minas Gerais State, despite Pará State being the pioneer in African mahogany cultivation (Falesi & Baena, 1999). Publications are distributed as follows, Southeast (66%), North (17%), Midwest (10%), Northeast (7%), and none from the South (Figure 5). These proportions mirror the regional distribution of African mahogany plantations, with 50% in the Southeast, 25% in the Midwest, 13% in the North, 6% in the Northeast, and 6% in the South (Ferraz Filho et al., 2021).

Table 2. Overview of the scientific literature published in Brazil regarding insect records associated with the African mahogany species *Khaya grandifoliola, Khaya ivorensis,* and *Khaya senegalensis.*

Khaya grandifoliola (28)**		*Khaya ivorensis* (1)**	*Khaya senegalensis* (12)**
Falesi & Baena (1999)*	Fialho Júnior et al. (2019)*	Santos (2019)	Covre et al. (2018d)
Lunz et al. (2008)*	Lemes et al. (2019)*		Covre et al. (2018a)
Farias et al. (2011)*	Santos (2019)		Covre et al. (2018b)
Matrangolo et al. (2016)*	Pinto (2020)		Dallacort et al. (2018)
Nascimento et al. (2016)*	Silva et al. (2020)*		Texeira et al. (2018)
Ceu et al. (2017)*	Coelho et al. (2021)		Benso (2019)
Moura et al. (2017)*	Fujihara et al. (2021)*		Covre et al. (2021)
Silva et al. (2017)*	Souza et al. (2021)		Bonfim et al. (2022)
Zanetti et al. (2017)*	Bonfim et al. (2022)		Gonçalves et al. (2023)
Covre et al. (2018d)	Silva et al.(2022)*		Queiroga et al. (2023)
Covre et al. (2018c)	Silva et al. (2024)		Silva et al. (2024)
Cristovam et al. (2018)	Covre et al. (2025b)		Covre et al. (2025b)
Luna et al. (2018)	Covre et al. (2025a)		
Pelozato et al. (2018)	Covre et al. (2025c)		

*Literature in which the African mahogany species was misidentified as *K. ivorensis.* **Numbers in parentheses represent the total number of publications for each species.

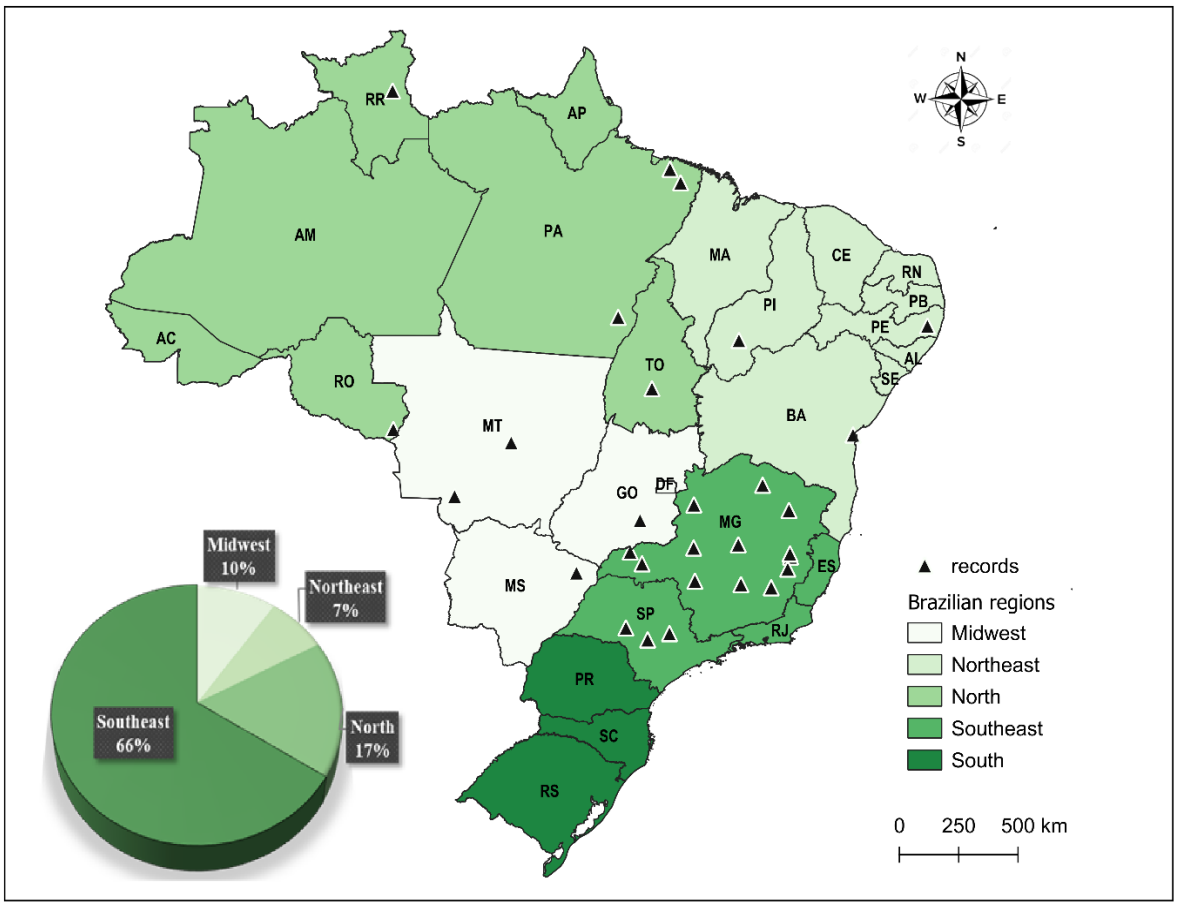

Figure 5. Records from the literature on insects associated with African mahogany (*Khaya* spp.) plantations by Brazilian region (1999–2025).

Concluding remarks

African mahogany, a valuable timber tree introduced to Brazil, faces challenges typical of exotic species, including pest threats. Difficulties in studying insect associations have been further complicated by the misidentification of the introduced species (*Khaya grandifoliola*). Recognizing the crucial role of accurate species identification and pest association in sustainable forestry, this manuscript critically evaluates the literature, corrects recurring taxonomic and entomological errors, and consolidates reliable data to support informed management and conservation decisions.

Most existing studies are occurrence reports that describe insect damage to plant parts but do not quantify economic losses. Consequently, the pest status of associated insects remains uncertain. In fact, only two publications have addressed both damage quantification and pest management strategies (Fialho Júnior et al., 2019; Covre et al., 2025a), leaving a significant gap in practical recommendations.

Therefore, future research should prioritize quantifying economic damage, developing integrated pest management techniques such as biological and chemical control, resistant or tolerant clones, and regular monitoring, and ensuring accurate species identification in publications. Additionally, facilitating access to research findings, particularly for African mahogany producers, is essential to promote informed decision-making.

Acknowledgments

To the agricultural engineer Rodrigo Rafael de Deus Machado for providing information on the defoliation caused by *Acharia* sp. on *K. grandifoliola* trees in Ipueiras, Tocantins, on February 27, 2025.

Conflict of interest

The authors have no conflict of interest to declare.

Author´s Credits

Luana S. Covre: conceptualization, methodology, formal analysis, investigation, writing – original draft. **Edilson Caron**: supervision, writing – review & editing. **Carlos A. H. Flechtmann**: supervision, investigation, writing – review & editing.

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