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**ALBIZIA (*Falcataria falcata*) TWIG BORER, Colobodina gen. inc.
(COLEOPTERA: CURCULIONIDAE) IN MALUKU:
IDENTIFICATION, LIFE HISTORY, AND
REPRODUCTIVE BEHAVIOR**

BRILIANO DOTER



**STUDY PROGRAM OF INTEGRATED PEST MANAGEMENT
FACULTY OF AGRICULTURE
BOGOR AGRICULTURAL UNIVERSITY
BOGOR
2026**



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Bogor, August 2026

Briliano Doter
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SUMMARY

BRILIANO DOTER. Albizia Twig Borer, Colobodina gen. inc. (Coleoptera: Curculionidae) in Maluku: Identification, Life History, and Reproductive Behavior. Supervised by Purnama Hidayat, Nina Maryana, and J. Audrey Leatemia.

Albizia, or sengon (*Falcataria falcata* (L.) Greuter & R. Rankin), is a fast-growing species frequently utilized in land restoration projects. Over time, *F. falcata* has become an invasive alien species due to its rapid growth, altering forest structure and outcompeting slow-growing native species in moist lowland forests on young lava flows of Pacific Ocean islands. A previously unidentified twig borer weevil has been recorded in Maluku. This weevil is classified within the tribe Ithyporini and is provisionally referred to as Ithyporini genus species (Ithyporini gen. sp.). Ithyporini gen. sp. demonstrates potential as a biological control agent for *F. falcata*. However, information regarding its taxonomic classification at the genus level, life history and developmental stages, and reproductive behavior remains insufficient. The objectives of this study were to (1) identify and describe Albizia twig-boring weevil based on comparative morphological characteristics at the genus level, (2) characterize its life history through laboratory rearing, and (3) document its mating and oviposition behavior under laboratory conditions.

The study was conducted from March to October 2025. Larvae, pupae, and pre-emergent adults were collected from nine purposively selected locations across Ambon and Seram Islands. External morphological identification utilized dichotomous keys and original genus descriptions, with analysis of 14 morphological characters. Molecular identification employed sequence data from GenBank. Life history studies were performed in the laboratory, using young twigs as both substrate and food, under a 12-hour light and 12-hour dark cycle, with an average temperature of 27°C and humidity of 79%–87%. Mating and oviposition behaviors were observed under laboratory conditions consistent with those used for life history studies. Mating behavior was assessed in 12 groups comprising 44 individuals, with male-to-female ratios ranging from 1.3:3 to 6:1. Data were analyzed using descriptive narratives, photographs, and graphs, while bioacoustic data were processed with specialized software. Oviposition behavior was observed in six females between 5:00 PM and 5:00 AM, Eastern Indonesian Time (WIT), with each observation conducted separately.

The findings indicate that Ithyporini gen. sp. is a member of the subtribe Colobodina and shares morphological similarities with the genera *Deretiosus* and *Colobodes*. However, the genetic distance between Ithyporini gen. sp. and *Colobodes ornatoideus* is smaller than that observed with *Deretiosus* species. Additionally, Ithyporini gen. sp. displays autapomorphic traits absent in the comparison genera. As its genus status remains unresolved, the species is designated according to open nomenclature guidelines as Colobodina genus incerta (Colobodina gen. inc.).

Colobodina gen. inc. eggs are approximately 1.47 x 0.9 mm², pale yellow in color, and require an incubation period of 8–16 days. The first instar lasts 7–9

days. The average lifespan is 34.9 days for males and 32.45 days for females. Adult *Colobodina* gen. inc. display early mating behavior characterized by rapid movement, particularly during daylight hours. This is followed by physical contact involving the antennae, legs, and rostrum, during which males attempt copulation multiple times. Females exhibit exploratory behavior toward other females before reproductive interactions. Additionally, bioacoustic signals produced by the elytral stridulation mechanism are integral to reproductive behavior. Copulation typically follows the pre-copulatory and bioacoustic phases. Copulatory activity occurs from late afternoon to midnight. Copulation initiates when the male mounts the female from the anterior, then adjusts to a level position before attempting genital penetration. Oviposition in *Colobodina* gen. inc. involves several stages: site search, substrate evaluation, excavation, egg laying, hole sealing, and resting. In laboratory conditions, females generally laid eggs on twigs 4–6 mm in diameter, while in the field, eggs were more frequently deposited on twigs approximately 2 mm in diameter.

Keywords: bioacoustics, mating behavior, morphology, oviposition, stridulation

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RINGKASAN

BRILIANO DOTER. Penggerek Ranting Albizia, Colobodina gen. inc. (Coleoptera: Curculionidae) di Maluku: Identifikasi, Kehidupan, dan Perilaku Reproduksi. Dibimbing oleh PURNAMA HIDAYAT, NINA MARYANA, dan J. AUDREY LEATEMIA.

Albizia, atau sengon (*Falcataria falcata* L.) Greuter & R. Rankin, adalah spesies yang tumbuh cepat dan umum digunakan dalam inisiatif restorasi lahan. Seiring waktu, *F. falcata* telah menjadi spesies asing invasif karena laju pertumbuhannya yang cepat, mengubah struktur hutan dan bersaing dengan spesies asli yang tumbuh lambat di hutan dataran rendah basah di daerah aliran lava muda di pulau-pulau Samudera Pasifik. Kumbang penggerek ranting yang belum teridentifikasi telah didokumentasikan di Maluku. Kumbang penggerek ranting tersebut diklasifikasikan dalam suku Ithyporini, yang disebut sebagai Ithyporini genus spesies atau disingkat sebagai Ithyporini gen. sp. Ithyporini gen. sp. memiliki potensi sebagai agen pengendalian hayati terhadap *F. falcata*. Namun demikian, data tentang klasifikasi taksonomi pada tingkat genus, sejarah hidup dan fase perkembangan, serta perilaku reproduksi saat ini masih kurang. Tujuan dari penelitian ini adalah (1) untuk mengidentifikasi kumbang penggerek ranting Albizia melalui analisis morfologi dan molekuler komparatif dengan genera yang terkait erat, (2) untuk mengkarakterisasi peri kehidupannya melalui pemeliharaan laboratorium, dan (3) untuk mendokumentasikan perilaku kawin dan oviposisinya di dalam kondisi laboratorium.

Studi ini berlangsung dari Maret hingga Oktober 2025. Larva, pupa, dan imago pra-emerjensi dikumpulkan dari lapangan dengan metode penentuan sampel secara sengaja. Lokasi sampling tersebar di Pulau Ambon dan Seram, dengan total sebanyak sembilan titik. Identifikasi morfologi eksternal dilakukan menggunakan kunci dikotomi dan deskripsi asli dari setiap genus komparatif dan menganalisis 14 karakter morfologi. Identifikasi secara molekuler menggunakan basis data sekuens yang tersimpan di GenBank. Kehidupan kumbang dipelajari melalui pemeliharaan laboratorium, menggunakan ranting muda sebagai media sekaligus pakan, di bawah siklus cahaya alami 12 jam terang dan 12 jam gelap, dengan suhu rata-rata 27 °C dan kelembapan relatif 79-87%. Perilaku kawin dan oviposisi diamati di bawah kondisi laboratorium yang identik dengan pengamatan kehidupannya. Pengamatan perilaku kawin dilakukan pada 12 kelompok yang terdiri dari 44 individu, dengan rasio jantan terhadap betina berkisar dari 1,3:3 hingga 6:1. Data diinterpretasikan menggunakan narasi deskriptif, foto, dan grafik, sedangkan bioakustik dianalisis menggunakan perangkat lunak. Perilaku oviposisi diamati pada enam betina, dengan pengamatan dilakukan antara pukul 5:00 sore hingga 5:00 pagi, Waktu Indonesia Timur (WIT). Perilaku oviposisi diamati secara terpisah, dan tidak terjadi dalam waktu yang bersamaan.

Hasil penelitian menunjukkan bahwa Ithyporini gen. sp. tergolong ke dalam subtribe Colobodina serta memiliki afinitas morfologis dengan genus *Deretiosus* dan *Colobodes*. Namun, jarak genetik antara Ithyporini gen. sp. dan spesies *Colobodes ornatoideus* lebih pendek dibandingkan dengan spesies-spesies *Deretiosus*. Selain itu, Ithyporini gen. sp. memiliki ciri autapomorfik yang tidak ditemukan pada genus-genus pembanding. Karena statusnya pada tingkat genus

belum dapat diputuskan, maka penyebutannya mengikuti pedoman nomenklatur terbuka sebagai *Colobodina* genus incerta atau disingkat *Colobodina* gen. inc.

Telur *Colobodina* gen. inc. berukuran sekitar 1,47 x 0,90 mm², berwarna kuning pucat, dan masa inkubasinya selama 8–16 hari. Larva instar pertama berlangsung selama 7-9 hari, sedangkan instar kedua berlangsung selama 7-12 hari. Larva instar terakhir menutup membentuk kamar pupa sebelum memasuki masa pupasi. Pupa bertipe eksarata dan rata-rata berlangsung selama 12,25 hari. Umur rata-rata imago jantan 34,93 hari, sedangkan betina 32,45 hari. Imago *Colobodina* gen. inc. menunjukkan masa awal perilaku kawin dengan aktivitas pergerakan cepat terutama pada siang hari. Aktivitas tersebut diikuti dengan kontak fisik menggunakan antena, tungkai, dan rostrum. Selama fase tersebut, jantan menunjukkan beberapa kali upaya kopulasi. Betina *Colobodina* gen. inc. menunjukkan perilaku eksplorasi terhadap betina lain sebelum interaksi reproduksi. Selain itu, suara bioakustik yang dihasilkan dari mekanisme stridulasi elytro-tergal menjadi bagian dalam perilaku reproduksi *Colobodina* gen. inc. Setelah fase pra-kopulasi dan bioakustik, umumnya terjadi kopulasi.

Aktivitas kopulasi dapat terjadi di sore hari hingga tengah malam. Kopulasi dimulai dengan jantan menaiki tubuh betina dari arah anterior, kemudian menyesuaikan posisi hingga sejajar lalu melakukan penetrasi genital. Oviposisi pada *Colobodina* gen. inc. terdiri dari beberapa tahap yaitu pencarian lokasi, evaluasi substrat, penggalian, peletakan telur, penutupan lubang, dan istirahat. Di laboratorium, betina biasanya meletakkan telur pada ranting yang berdiameter 4-6 mm, sedangkan di lapangan lebih sering ditemukan keberadaan telur pada ranting berukuran 2 mm.

Kata kunci: bioakustik, morfologi, oviposisi perilaku kawin, stridulasi



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IDENTIFICATION, LIFE HISTORY, AND
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BRILIANO DOTER

A Thesis
as one of the requirements for obtaining
the Master of Science degree in
Integrated Pest Management Study Program

**STUDY PROGRAM OF INTEGRATED PEST MANAGEMENT
FACULTY OF AGRICULTURE
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PREFACE

Gratitude is expressed to Almighty God for His grace and guidance, which made the completion of this master's thesis possible. This research took place from March to October 2025 and is titled " *Albizia* Twig Borer, *Colobodina* gen. inc. (Coleoptera: Curculionidae) in Maluku: Identification, Life History, and Reproductive Behavior." This thesis fulfills the requirements of the Integrated Pest Management Study Program at the Graduate School of Bogor Agricultural University.

The author expresses appreciation to the Chair of the Supervisory Committee, Prof. Dr. Ir. Purnama Hidayat, M.Sc. and Committee Members Dr. Ir. Nina Maryana, M.Si. and Ir. Johanna Audrey Leatemia, M.Sc., Ph.D., for their guidance, support, criticism, and recommendations during the field and laboratory research, as well as during the preparation and writing process of the thesis. Gratitude is also expressed to the External Examiner, Dra. Dewi Sartiami, M.Si., Ph.D. for her recommendations to improve this thesis. I also extend my gratitude to Riekresna Florinda Noya, S.P. and Geogriani Anthonius, S.P. for their assistance in sample collection on Ambon and Seram Islands, as well as their support in the laboratory. This research was conducted in collaboration between the USDA Forest Service in Hawaii, the Plant Protection Department of Bogor Agricultural University, and Pattimura University (UNPATTI) to identify viable biological control agents for *Falcataria falcata*. Furthermore, special thanks are extended to PT. Dewa Agricoco Indonesia and JHL Group for their financial contributions to the research over the past two years.

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Although it has its limitations, I hope this master's thesis can contribute to the field of entomology, be beneficial to those who need it, and advance the field.

Bogor, August 2026

Briliano Doter

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