

Proceedings Of
**SEAMEO BIOTROP
THIRD INTERNATIONAL CONFERENCE
ON TROPICAL BIOLOGY**

**“Conservation, Enhancement and Sustainable Use
of Indigenous Tropical Flora and Fauna”**



Edited by
Jesus C. Fernandez
Cahyo Wibowo

Bogor, 20-21 September 2018
SEAMEO BIOTROP Convention Hall



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PROCEEDINGS
OF
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With Compliments
SEAMEO BIOTROP

SOUTHEAST ASIAN REGIONAL CENTRE FOR TROPICAL BIOLOGY
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PREFACE

We are pleased to publish the proceedings of our Third International Conference on Tropical Biology held on 20-21 September, 2018 in Bogor, West Java Province, Indonesia. The conference theme, “Conservation, Enhancement, and Sustainable Use of Indigenous Tropical Flora and Fauna”, was in response to the urgent need in ensuring a sustainable use of indigenous tropical flora and fauna, as well as the conservation of species facing extinction due to rapid habitat loss caused by rampant deforestation for agricultural purposes and massive infrastructure development, unregulated collection and trafficking of indigenous plants and animals. We believe that there are several past experiences of sustainable use and conservation schemes by governments and non-governmental organizations that have been successful. Lessons learned from these experiences are critical to generate and formulate practical and sustainable conservation strategies for indigenous tropical flora and fauna, determine and prioritize research needs based on current policies and research results, and strengthen participation and contribution of stakeholders in eliminating current problems and at the same time, enhancing the conservation and sustainable use of the region's biodiversity and natural resources.

We were fortunate to convene 227 scientists and practitioners from eight countries during the conference to share useful lessons, address challenges, and generate commitments to strengthen policy decisions and work collaboratively towards conservation and sustainable use of indigenous tropical flora and fauna, especially in the Southeast Asia region.

This volume of our conference proceedings contains the full papers and abstracts of the keynote addresses, panel discussion, and parallel session oral and poster presentations. The keynote addresses attempt to illustrate the gains and challenges, the diversity and resiliency as well as the approaches, technologies and innovations in conservation, enhancement and sustainable use of indigenous tropical flora and fauna. The panel discussions focus on the policies and other legal frameworks as well as the future directions in conservation, enhancement and sustainable use of indigenous tropical flora and fauna. The parallel session papers provide actual experiences on the four conference subthemes, namely: (1) Diversity and Resiliency of Indigenous Tropical Flora and Fauna and Their Ecosystem; (2) Approaches, Technologies and Innovations in Conservation, Enhancement and Sustainable Use of Indigenous Tropical Flora and Fauna; (3) Socio-economic, Cultural and Ethical Aspects in Conservation, Enhancement and Sustainable Use of Indigenous Tropical Flora and Fauna; and (4) Policies and Other Legal Frameworks in Conservation and Sustainable Use of Indigenous Tropical Flora and Fauna. As much as we would have wanted full papers included in this publication, we respect the presenters' decision to just submit the abstracts of their presentations. We thank all of them for their contributions in making this publication possible. We hope that the papers and abstracts, much more the synthesis and recommendations as well as future agenda generated from the conference, could spark new and continuing efforts to pursue conservation, enhancement, and sustainable use of indigenous tropical flora and fauna in the region.

Our deepest appreciation goes to Southeast Asian Ministers of Education Organization (SEAMEO), Ministry of Environment and Forestry of the Republic of Indonesia, National Committee for Indonesian Germ Plasm, Ministry of Agriculture of the Republic of Indonesia, Lembaga Ilmu Pengetahuan Indonesia (Indonesian Institute of Science/LIPI), Institut Pertanian Bogor (IPB University), Universiti Putra Malaysia, National University of Singapore, Forest Stewardship Council (FSC) Indonesia, Central Luzon State University Philippines, Burung Indonesia, Pampanga State Agricultural University Philippines, Cagayan State University

Philippines, PT Sinarmas Tbk. Indonesia, Bank Mandiri, Bank Mandiri Syariah and PT Garuda Food for supporting us to hold this conference. We highly value the time and effort of the Scientific Committee members for reviewing all the submitted abstracts and helping us finalize the list of paper and poster presenters. We recognize the valuable contributions of SEAMEO BIOTROP staff members for ensuring the smooth implementation of the conference and in packaging this publication.

We look forward to our Fourth International Conference on Tropical Biology in 2020.

Conference Coordinator and Proceedings Editors

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1. Welcome Remarks

Dr Irdika Mansur

SEAMEO BIOTROP Director

- Dr Kirsfianti Linda Ginoga, Director of Forest Research Centre, Forest Research Development and Innovation Agency, Ministry of Environment and Forestry of the Republic of Indonesia,
- Governing Board Members, Deputy Directors and Staff of Southeast Asian Ministers of Education Organization (SEAMEO) for Tropical Biology (BIOTROP),
- Dr Maria Ulfah, Chairperson of the 3rd International Conference on Tropical Biology,
- Our Colleagues from Indonesian universities, research institutes, schools and private companies,
- Representatives of local governments from all over Indonesia,
- Distinguished speakers and participants,
- Ladies and Gentlemen,

Assalamu'alaikum warahmatullaahi wabarakatuh,

I am pleased to welcome you all to Bogor City and to SEAMEO BIOTROP for our 3rd International Conference on Tropical Biology starting today until 21 September 2018 which we are now conducting in our Convention Hall. We expect this conference to be a venue for sharing knowledge, perspectives, and experiences among the participants and speakers on the theme "Conservation, Enhancement, and Sustainable Use of Indigenous Tropical Flora and Fauna." As SEAMEO BIOTROP Director, I am honored for our Centre to host this conference.

First, allow me to briefly introduce our Centre to all of you. SEAMEO BIOTROP is one of 24 specialist centres of the Southeast Asian Ministers of Education Organization (SEAMEO). Our Centre was established on 6 February 1968 and is mandated to conduct research, capacity building, and information exchange toward addressing biology-related problems in Southeast Asia. Since 2012 up to now, SEAMEO BIOTROP's vision is to be "A leading Centre in enriching and promoting the real values of tropical biology in Southeast Asia". Our mission is to provide scientific knowledge and build capacities of institutions and communities in conserving and managing tropical biology sustainably for the well-being of communities and the environment of Southeast Asia. For the next five years, we will be focusing our activities on three program thrusts, namely: (1) Restoration of Degraded Landscapes/Ecosystems, (2) Sustainable Management of Intensively Used Landscapes/Ecosystems, and (3) Conservation and Sustainable Use of Unique Ecosystems/Landscapes of High Biodiversity. We believe that organizing an international conference on tropical biology (ICTB) is one of the ways through which we can realize our vision and mission and address our program thrusts.

Ladies and Gentlemen,

In recent years, we have witnessed an increasing concern on ensuring a sustainable use of indigenous tropical flora and fauna, as well as the conservation of species facing extinction due to rapid habitat loss caused by rampant deforestation for agricultural purposes and massive infrastructure development, unregulated collection and trafficking of indigenous plants and animals. This scenario led us to focus on "Conservation, Enhancement and Sustainable Use of Indigenous Tropical Flora and Fauna" as the theme of this year's conference.

I am very pleased to see delegates from various countries in and outside the Southeast Asian region as well as representatives from many Indonesian institutions. I believe that with the various expertise of the participants and speakers present here, we would have interesting and enthusiastic discussions during our conference. I sincerely hope that this conference will be able to generate consensus among participants to formulate practical and sustainable ways, based on current policies and research results, to strengthen participation and contribution of stakeholders in eliminating current problems and, at the same time, enhancing the conservation and sustainable use of the region's biodiversity and natural resources.

Ladies and Gentlemen,

I would like to express my gratitude to the Southeast Asian Ministers of Education Organization (SEAMEO) and partner-institutions for supporting us to hold this conference. Let me take this opportunity to acknowledge them here, namely: the Ministry of Environment and Forestry of the Republic of Indonesia, National Committee for Indonesian Germ Plasm, Ministry of Agriculture of the Republic of Indonesia, Indonesian Institute of Science, Institut Pertanian Bogor, Universiti Putra Malaysia, National University of Singapore, Forest Stewardship Council (FSC) Indonesia, Central Luzon State University Philippines, Burung Indonesia, Pampanga State Agricultural University Philippines, Cagayan State University Philippines, PT Sinarmas Tbk Indonesia, Bank Mandiri, Bank Mandiri Syariah and PT Garuda Food. I would also like to express my heartfelt appreciation to all the members of our Conference organizing and scientific committees for their hard work and dedication in making sure that all things are in place and running well. And to all of our speakers and participants, thank you so much for your presence and interest to be a part of this important conference, because without you this event could not be realized.

I wish everyone a productive conference and I hope that you will find your stay in SEAMEO BIOTROP a pleasurable one. Once again, I extend our warm welcome to all of you.

Thank you very much.

Wassalamu'alaikum warahmatullaahi wabarakaatuh.

INVENTORY AND IDENTIFICATION OF FUNGUS CAUSATIVE LEAF SPOT IN JABON (*Anthocephalus* sp.) IN INDONESIA

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ABSTRACT

Jabon (*Anthocephalus* sp.) is the one of the most economically forestry crops. Jabon has several advantages compared to other woody plants. Among benefits of jabon include a very straight stem, has rapid growth, and has a self-deceased branch (self-pruning), so it does not require pruning. However, the development of jabon seeds faces obstacles in the form of pathogenic infection causing leaf disease on the seeds of red jabon in the nursery. Information related to the causes of leaf spots disease and its pathogenic symptoms has not been studied, which hinders the determination of the disease. Objectives of this research were to inventory the types of leaf spot symptoms and identify the pathogenic fungi causing the symptoms. Results of isolation and identification of pathogenic fungi showed six genus of pathogenic fungi i.e. *Pestalotia* sp. (from Yogyakarta, Maluku and Bogor), *Botryodiplodia* sp. (from Yogyakarta), *Curvularia* sp. (Kuningan and Bogor), *Rhizoctonia* sp. (Cianjur and Maluku), *Colletotrichum* sp. (Bogor), and *Botrytis* sp. (Bogor).

Keywords: Disease symptoms isolation, forest plant, fungal pathogen

INTRODUCTION

Jabon (*Anthocephalus* sp.) is one of the most economical forestry crops. Jabon has several advantages compared to other woody plants such as sengon (*Albizia chinensis*), acacia (*Acacia* sp.), pine (*Pinus* sp.), and eucalyptus (*Eucalyptus* sp.). In addition to its rapid growth, the benefits of Jabon include a very straight stem and has a self-deceased branch (self-pruning), so it does not require pruning. In Indonesia, there are two types of jabon namely white Jabon (*Anthocephalus cadamba* Roxb.) and red jabon (*A. macrophyllus* Roxb.). Prospects for developing Jabon crops implicate the supply of Jabon seeds. However, the development of Jabon seeds faces obstacles in the form of pathogenic infection causing leaf disease on the seeds of red jabon in the nursery. Information related to the causes of leaf spots disease and its pathogenic symptoms has not been studied, which hinders the determination of the disease. Objectives of this research were to inventory the types of leaf spot symptoms and identify the pathogenic fungi causing the symptoms.

MATERIALS AND METHODS

Sampling of Symptomatic Leaves

Samples of symptomatic Jabon leaves were collected from Yogyakarta, Cianjur, Kuningan, and Bogor for white Jabon species, and in Maluku for red Jabon species. The sample leaves taken

were leaves with symptomatic spots. The samples were then documented and taken to the laboratory for pathogen isolation.

Postulate Koch

Koch Postulate Test. The stages of Koch postulate test conducted in this study consisted of isolation, inoculation, and the reisolation of pathogenic fungi.

Isolation of Fungi

Jabon leaves having spot and blight symptoms were isolated by taking part of the leaves between infected and uninfected tissues. The leaf pieces were then surface-sterilized by soaking them in 70% alcohol solution, followed by rinsing 3 times with sterile distilled water. The sterilized pieces of leaves were then placed on potato dextrose agar (PDA) media and incubated for 7 days. The hyphae growing from the leaf pieces were then purified in new PDA media. All stages of isolation were carried out in laminar air flow to maintain the working process.

Inoculation

Pathogenic fungi isolates obtained were then inoculated on 2-month-old white Jabon seedlings. The inoculation technique was carried out by attaching the agar block to Jabon leaves which had previously been injured. Inoculated seeds were then covered using plastic to maintain moisture. Observations were made for seven (7) days to find out the symptoms that occurred in Jabon seeds.

Reisolation

Reisolation was done after the inoculated leaves showed symptoms. Method used for the reisolation was the same method used in the pathogen isolation activity. Inoculated cobs will be considered as pathogenic and regarded as pathogens infecting jabon samples, if the symptoms of pathogen inoculation are identical to the symptoms in the sample leaves.

Identification of Pathogenic Fungi

The purified fungi colonies were then identified. Identification fungi were carried out by observing macromorphology and micromorphology. Macromorphological forms consist of colony colors on PDA media and colony growth speed. Micromorphological forms consist of the form of hyphae, conidia, conidiophores, and conidial size. Identification refers to identification key book of Barnett and Hunter (1998).

RESULTS AND DISCUSSION

Based on the results of observations in all observation locations, various leaf spot symptoms were found. Jabon leaves with symptomatic spots were characterized by the occurrence of necrosis (tissue death) causing the appearance of yellow, brown, and black color. In severe infections, the disease can cause leaves to perforate and fall. There were ten types of leaf spot symptoms found on leaves from Yogyakarta, Cianjur, Kuningan, Maluku and Bogor (Fig. 1).

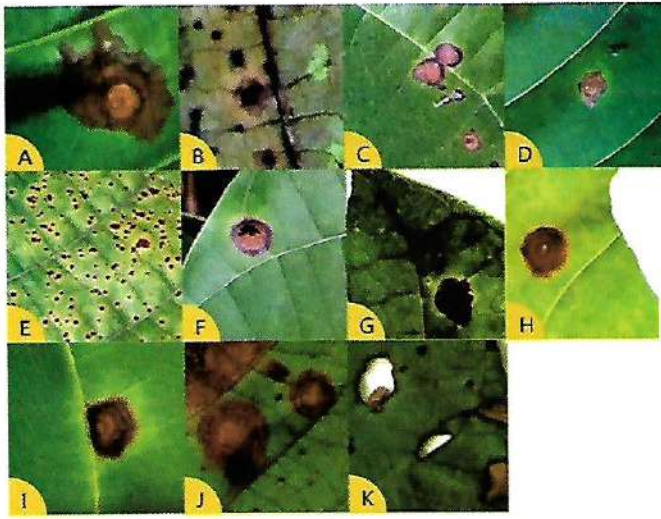


Figure 1 Types of leaf spot symptoms in Jabon (*Anthocephalus* sp.) A. YB1 (Yogyakarta), B. YK3 (Yogyakarta), C. BGB01 (Bogor), D. BGB02 (Bogor), E. BGB03 (Bogor), F. BGB04 (Bogor), G. C21 (Cianjur), H. C6 (Cianjur), I. K6 (Kuningan), J. AC (Maluku), K. AD (Maluku)

There were two types of leaf spot symptom from Yogyakarta, two types from Cianjur, one type from Kuningan, two types from Maluku, and four types from Bogor. Each type of the leaf spot symptoms had different characteristics from each other. In general, size ranges of the leaf spot symptoms were from <math><0.1\text{ mm}</math> to 1 cm. The leaf spot color found were light brown, dark brown, and black, indicating the death of leaf tissue. Some of the leaf spot symptoms also contained a yellow *hollo*. On a severe infection, the spots can spread evenly on the surface of the leaf and cause leaf holes. According to Manik *et al.* (2016) the leaf spot symptoms are indicated by the presence of necrosis in round, oval, and irregular leaves. In some spots there were also commonly formed yellow *hollo* around dead tissue.

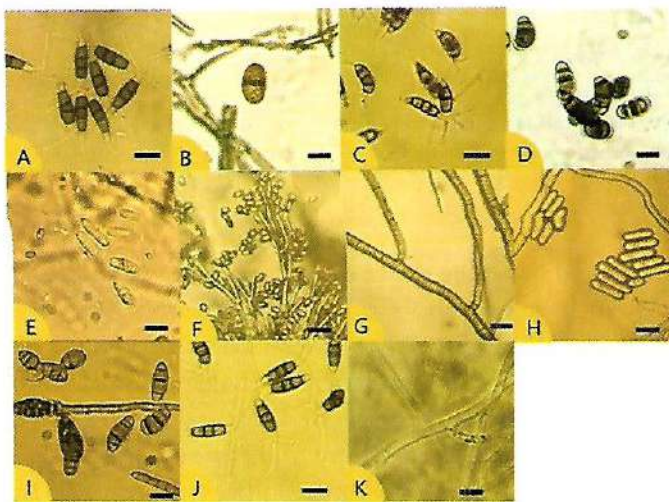


Figure 2 Pathogenic fungi causing leaf spot symptoms in Jabon (*Anthocephalus* sp.) A. *Pestalotia* sp. YB1 (Yogyakarta), B. *Botryodiplodia* sp. YK3 (Yogyakarta), C. *Pestalotia* sp. BGB01 (Bogor), D. *Curvularia* sp. BGB02 (Bogor), E. *Colletotrichum* sp. BGB03 (Bogor), F. *Botrytis* sp. BGB04 (Bogor), G. *Rhizoctonia* sp. C21 (Cianjur), H. *Colletotrichum* sp. C6 (Cianjur), I. *Curvularia* sp. K6 (Kuningan), *Pestalotia* sp. J. AC (Maluku), K. *Rhizoctonia* sp. AD (Maluku)

Spots and blight diseases on Jabon leaves can kill leaf tissue, so that it can decrease photosynthesis and can turn plants into having severe infections. There are several fungi that can cause blight and spotting on the leaves of forestry plants, including *Pestalotia* sp., *Lasiodiplodia* sp., *Cercospora* sp., *Curvularia* sp., *Helminthosporium* sp., *Gloeosporium* sp., *Cylindrocladium* sp., and *Colletotrichum* sp. (Anggraeni 2009).

Table 1 Leaf spot symptoms characteristics of Jabon (*Anthocephalus* sp.)

Region/ Code	Spot Characteristics				Pathogen
	Color	Diameter (cm)	Shape	Hollo	
<i>Yogyakarta</i>					
YB1	Light brown and dark brown in the edges	1 – 1.5	Circular with irregular shape in the edges	✓	<i>Pestalotia</i> sp.
YK3	Dark brown – black	0.1 – 0.3	Circular	-	<i>Botryodiplodia</i> sp.
<i>Bogor</i>					
BGB01	Light brown and dark brown in the edges	0.3 – 1	Circular	-	<i>Pestalotia</i> sp.
BGB02	Light brown and dark brown in the edges	0.3 – 0.5	Irregular	✓	<i>Curvularia</i> sp.
BGB03	Light brown	0.1 – 0.2	Irregular	✓	<i>Colletotrichum</i> sp.
BGB04	Light brown and dark brown in the edges	0.3 – 0.4	Circular	-	<i>Botrytis</i> sp.
<i>Cianjur</i>					
C6	Light brown	0.75 – 1	Circular	✓	<i>Colletotrichum</i> sp.
C21	Dark brown	0.5 – 0.7	Circular	✓	<i>Rhizoctonia</i> sp.
<i>Kuningan</i>					
K6	Light brown	0.6 – 0.75	Circular	✓	<i>Curvularia</i> sp.
<i>Maluku</i>					
AC	Light brown and reddish in the edges	0.3 – 1	Circular	-	<i>Pestalotia</i> sp.
AD	Light brown and dark brown in the edges	0.3 – 0.5	Irregular	-	<i>Rhizoctonia</i> sp.

Curvularia sp. is reported to be the cause of yellowish spots and *Pestalotiopsis* sp. is reported to be the cause of brownish yellow spots on Tembesu leaves (*Fragraea fragrans*) in southern Sumatra (Asmaliyah *et al.* 2015). *Curvularia* sp. is also known to cause leaf spot symptoms on nutmeg (Rachmawati & Soekarno 2016) and jatropa (Laksono *et al.* 2010). *Gloeosporium* sp. and *Colletotrichum* sp. each was reported as the cause of blotches and blight on Damar Siput plants. Leaf spots on Meranti Luang plants are caused by *Marssonina* sp. (Malaysia *et al.* 2005). Leaf spots caused by *Curvularia* sp. in the palm oil is shown by the initial symptoms of translucent yellow spots that can be seen on both leaf surfaces, round, spotting and then slowly becomes light brown and forms a circular pattern. Spots will then turn out to be more beautiful by being surrounded by a yellowish orange halo (Lalang *et al.* 2016).

CONCLUSION

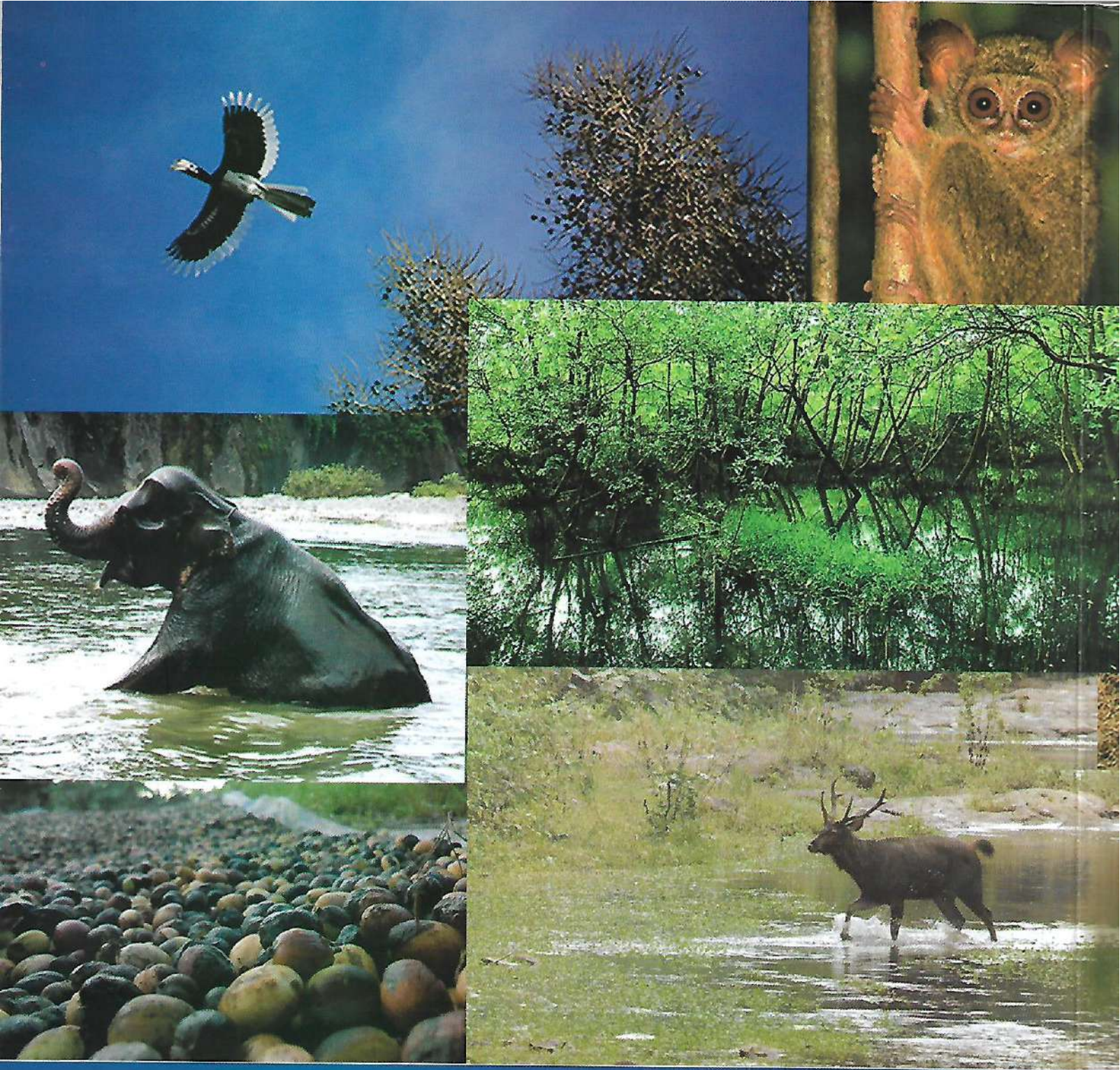
Results of isolation and identification of pathogenic fungi showed six genera of pathogenic fungi, i.e. *Pestalotia* sp. (from Yogyakarta, Maluku, and Bogor), *Botryodiplodia* sp. (from Yogyakarta), *Curvularia* sp. (Kuningan and Bogor), *Rhizoctonia* sp. (Cianjur and Maluku), *Colletotrichum* sp. (Bogor), and *Botrytis* sp. (Bogor). Each of the fungi causes different symptoms at different locations, although it is caused by the same genus of fungi.

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