



Embrapa



PFBR

**Pesquisa Florestal Brasileira
Brazilian Journal of Forestry Research**

v. 39, e201902043
Special issue, 2019
ISSN 1809-3647

Editor-Chief

Patrícia Póvoa de Mattos
Embrapa Florestas, Colombo, PR, Brazil

Co-editors

Alvaro Figueredo dos Santos
Embrapa Florestas, Colombo, PR, Brazil

Annete Bonnet
Embrapa Florestas, Colombo, PR, Brazil

Carolin Córdova Sáez
Universidad de Concepcion, Concepción, Chile

Cristiane Fioravante Reis
Embrapa Florestas, Colombo, PR, Brazil

Daniel Burckhardt
Naturhistorisches Museum, Switzerland

Eugenio Alfredo Sanfuentes von Stowasser
Universidad de Concepción, Centro de Biotecnología, Concepción, Chile

Francides Gomes da Silva Júnior
Universidade de São Paulo, Campus Luiz de Queiroz, Piracicaba, SP, Brazil

Hugo Enrique Fassola
Instituto Nacional de Tecnología Agropecuaria Estación Experimental Agropecuaria Montecarlo (INTA-EEA Montecarlo), Misiones, Argentina

Guilherme Schnell e Schuhli
Embrapa Florestas, Colombo, PR, Brazil

Jose Elidney Pinto Junior
Embrapa Florestas, Colombo, PR, Brazil

Krisle da Silva
Embrapa Florestas, Colombo, PR, Brazil

Marcelo Francia Arco-Verde
Embrapa Florestas, Colombo, PR, Brazil

Marilice Cordeiro Garrastaza
Embrapa Florestas, Colombo, PR, Brazil

Peter Michael Spathelf
University for Sustainable Development Eberswalde (FH), Eberswalde, Germany

Valderês Aparecida de Sousa
Embrapa Florestas, Colombo, PR, Brazil

Associate Editors

Afonso Figueiredo Filho
Universidade Estadual do Centro-Oeste, Departamento de Engenharia Florestal, Irati, PR, Brazil

Aloisio Xavier
Universidade Federal de Viçosa, Departamento de Engenharia Florestal, Viçosa, MG, Brazil

Eduardo Mansur
International Tropical Timber Organization (ITTO), Yokohama, Japan

Gledson Vígiano Bianconi
Instituto Federal do Paraná, Campus Pinhais, Brazil

Heinrich Spiecker
University of Freiburg, Freiburg, Germany

John Parrotta
US Forest Service, Research & Development, Virginia, United States

Ivan Tomaselli
STCP Engenharia de Projetos Ltda, Curitiba, PR, Brazil

Jorge Alberto Gazel Yared
Universidade Federal Rural da Amazônia, Belém, PA, Brazil

José Aníbal Palavecino
Universidad Nacional de Misiones, Eldorado, Misiones, Argentina

José Rente Nascimento
International Consultant, United States

Laercio Couto
Centro Brasileiro Para Conservação da Natureza e Desenvolvimento Sustentável (CBCN), Viçosa, MG, Brazil

Leif Nutto
Albert-Ludwigs-Universität Freiburg, Instituto Para Utilização da Madeira e das Ciências, Freiburg, Germany

Manoel Malheiros Tourinho
Universidade Federal Rural da Amazônia, Instituto Socioambiental e dos Recursos Hídricos - ISARH, Belém, PA, Brazil

Marcus Vinicio Neves d'Oliveira
Embrapa Acre, Rio Branco, AC, Brazil

Pablo Christian Cruz Johnson
Centro de Investigación de Estudios de Recursos Naturales, Santiago, Chile

Ricardo Cesar Larrobla
Consultor independente, Maldonado, Uruguay

Sebastião do Amaral Machado
Universidade Federal do Paraná, Curitiba, PR, Brazil

Versides Sebastião de Moraes e Silva
Universidade Federal de Mato Grosso, Faculdade de Engenharia Florestal, Cuiabá, MT, Brazil

Secretaria

Elisabete Marques Oaida
Embrapa Floresta, Colombo, Brazil

Editores

Cristina Mosol
Curitiba, Brazil

Normalização Bibliográfica

Francisca Rasche
Embrapa Floresta, Colombo, Brazil



Congress Scientific Committee (CSC)

CSC Chair

Jerry Vanclay

Southern Cross University, Australia

CSC Members

Pil Sun Park

Division 1

Seoul National University, South Korea

Santiago González-Martínez

Division 2

French National Institute for Agricultural Research-INRA, France

Woodam Chung

Division 3

Oregon State University, USA

Donald Hodges

Division 4

University of Tennessee, USA

Pekka Saranpää

Division 5

Natural Resources Institute Finland / Luonnonvarakeskus-Luke, Finland

Cecil Konijnendijk

Division 6

University of British Columbia, Canada

Eckehard Brockerhoff

Division 7

Scion Crown Research Institute-CRI, New Zealand

Alexia Stokes

Division 8

French National Institute for Agricultural Research-INRA, France

Sandra Luque

Division 8

National Research Institute of Science and Technology for Environment and Agriculture-IRSTEA, France

Daniela Kleinschmit

Division 9

University of Freiburg, Germany

Björn Hånell

Vice-President Divisions

Swedish University of Agricultural Sciences, Sweden

John Parrotta

Vice-President Task Forces, Special Programmes, Projects and IUFRO-LED Initiatives

US Forest Service, USA

Dolores Pavlovic

Student Representative

International Forestry Students Association

Joseph Cobbinah

Africa Representative

University of Ghana, Africa

Manuel Guariguata

Latin America Representative

Center for International Forestry Research-CIFOR, Peru

Patrícia Povoá de Mattos

COC Representative

Embrapa Florestas, Brazil

The abstracts in this Special Issue are the sole responsibility of their authors. The statements and opinions they contain, as well as mentions of any machinery, equipment, products, or techniques, do not constitute endorsement by the Organizing Committee or the institutions involved in the 25th IUFRO World Congress. The editors and event organizers are not responsible for spelling, grammar errors, content, in these abstracts, or for any inaccuracies or ambiguity in the identification or affiliation of their authors.

Pesquisa florestal brasileira = Brazilian journal of forestry research. - v. 39, e 201902043, Special issue (2019) - Colombo : Embrapa Florestas, 2019.

Continuous publishing since 2018-

Published online: <<http://www.cnpf.embrapa.br/pfb/>>.

Special issue: Abstracts of the XXV IUFRO World

Congress: Forest Research and Cooperation for Sustainable Development.

ISSN 1809-3647 (print)

ISSN 1983-2605 (online)

1. Forest – Journal - Brazil. 2. Forestry research. 3. Sustainable development. I. Embrapa Florestas.

CDD 634.905

Francisca Rasche CRB 9-1204

© Embrapa, 2019

Pesquisa Florestal Brasileira /Brazilian Journal of Forestry Research

**Forest Research and Cooperation
for Sustainable Development**

XXV IUFRO World Congress, 29 sept - 5 October 2019,

Curitiba, PR, Brazil

Abstracts

América del Sur. En este estudio se evaluó el rol del paisaje térmico como forzante ambiental en la fenología de *O. amphimone* en la Región de Aysén, Chile. Se utilizaron datos de temperatura del proyecto MERRA-2 para reconstruir el paisaje térmico de los últimos 15 años, utilizando los grados-días acumulados (GDA) como proxy de la idoneidad térmica, y mediante un modelo logístico, se estimó la probabilidad de tener un brote en función de los GDA en cada localidad. Además, se construyó un modelo fenológico regional para conocer la respuesta térmica de *O. amphimone* respecto a los GDA. Los GDA muestran un patrón heterogéneo en toda la región, lo que hace que la fenología de *O. amphimone* sea altamente variable entre localidades, y que la probabilidad de ocurrencia de brotes este determinada por distintos umbrales térmicos. Finalmente el modelo fenológico sugiere una relación positiva entre la acumulación térmica y la abundancia poblacional relativa de la especie, sin embargo, esta relación es específica para cada sitio. Este estudio es un primer paso en el desarrollo de herramientas para evaluar el riesgo de brotes en todo el territorio, y de este modo, optimizar las estrategias de manejo para minimizar el impacto de esta plaga en América del Sur.

Susceptibility of three commercially significant Amazonian trees to termite attack (Isoptera: Insecta) / Susceptibilidade de três árvores amazônicas de interesse comercial ao ataque de térmitas (Isoptera: Insecta)

Diulio Andrew Torres de Souza^{1,2}, Norma Cecília Rodrigues Bustamante¹, Rayssa Gomes Vasconcelos¹, Luiz de Moura Neto¹, João Victor Barros Wezen¹

¹Universidade Federal do Amazonas, Departamento de Ciências Florestais Manaus, Brazil; ²Instituto Nacional de Pesquisas da Amazônia, Manaus, Brazil (diulio51@gmail.com; ncbustamante@gmail.com; rayssagomes85@gmail.com; luizmouraneto@yahoo.com.br; jaowezen@gmail.com)

O conhecimento acerca do comportamento de térmitas em relação às espécies florestais amazônicas de interesse comercial ainda é incipiente. O presente estudo objetivou avaliar a susceptibilidade de cupiúba (*Goupia glabra*), guariúba (*Clarisia racemosa*) e marupá (*Simarouba amara*), ao ataque de *Nasutitermes surinamenses*, *Nasutitermes corniger* e *Cornitermes acignathus*. Foram confeccionados corpos-de-prova (estacas) de cada espécie, totalizando 108 estacas. As mesmas foram numeradas, pintadas com diferentes cores na extremidade e tiveram o volume, peso úmido e densidade básica, determinados. Para a obtenção do peso seco, as amostras foram separadas por espécie e acondicionadas em estufa (103°C). No Campus-UFAM, instalou-se 3 áreas amostrais, cada uma com 12 pontos próximos a atividade térmica. Ao redor de cada ponto, foram enterradas 3 estacas (1 por espécie). Aos 90 e 120 dias, foram removidas 6 estacas por espécie, de cada área, que passaram pelo processo de secagem; 55% das madeiras estavam infestadas, a espécie marupá, apresentou a maior frequência de ocorrência de térmitas (81%), guariúba (44%) e cupiúba (39%). O marupá sofreu maior ataque de *N. surinamenses* e *N. corniger*, enquanto que a cupiúba foi a menos infestada. Já *C. acignathus* demonstrou maior atração pelas estacas de marupá e guariúba.

The relationship between the distribution range of *Nothofagus* species and herbivore species richness in Chile / Relación entre la amplitud del rango de distribución de especies del género *Nothofagus* y la riqueza de especies herbívoras en Chile

Daniela López¹, Carmen Paz Silva¹, Carlos Riquelme², Sergio Estay^{1,3}

¹Universidad Austral de Chile, Valdivia, Chile; ²Pontificia Universidad Católica de Chile, Santiago, Chile; ³Centro de Ecología Aplicada y Sustentabilidad (CAPE), Santiago, Chile (danyelalopez@gmail.com; carmenpazsilva@gmail.com; carlosriquelmemv@gmail.com; sergio.estay@gmail.com)

El género *Nothofagus* en Sudamérica se extiende desde los 30° a los 56° S. En Chile, las especies arbóreas que componen el género *Nothofagus* presentan diferentes amplitudes de su rango de distribución, se caracterizan por tener hojas tanto hojas caducas como perennes, y albergar diferentes especies de herbívoros, los cuales depredan las especies arbóreas generando diferentes tipos de daño. En este trabajo, nosotros evaluamos la relación entre la amplitud del rango de distribución de ocho especies del género *Nothofagus* y la riqueza de especies herbívoras, cuantificando el mecanismo de daño predominante. Nosotros encontramos una relación débil entre la amplitud del rango de distribución y la riqueza de especies herbívoras que depredan las especies arbóreas ($r = 0.60$, I.C. [-0.19, 0.92]). En total, se cuantificaron 145 especies herbívoras que depredan al género *Nothofagus*, y el mecanismo de daño predominante fue la defoliación ~ 30 %. En términos especie – específico, *Nothofagus dombeyi*, fue la especie arbórea que presentó la mayor presión de depredación, i.e. una mayor riqueza de especies defoliadoras asociadas a esta especie.

Ambrosia and bark beetle community along with latitudinal gradient: temporal dynamics of the community and phylogenetic effects of plants on the community

Naoto Kamata^{1,2}, Sunisa Sanguansub², Yong Peng¹, Teerapong Saowaphak³, Sawai Buranapanichpan³, Anut Buranapanichpan^{1,4}

¹The University of Tokyo, Furano, Japan; ²Kasetsart University, Kamphaeng Saen, Thailand; ³Chiang Mai University, Chiang Mai, Thailand; ⁴Royal Department of Agriculture Thai, Bangkok, Thailand (kamatan@uf.a.u-tokyo.ac.jp; agrssss@ku.ac.th; pengyong@uf.a.u-tokyo.ac.jp; agitswph@gmail.com; sawai.b@cmu.ac.th; turtlekung@hotmail.com)

Ambrosia and bark beetles are recognized as important forest insect groups because they sometimes cause devastating damage to forest ecosystems. Our aim is to clarify ambrosia and bark beetle community and their relationship with host plants along with a latitudinal gradient. In this paper, comparison among three locations, 2 sites in Japan and 1 in Thailand, will be introduced. Ethanol baited traps ('traps') and bait logs were used in this study. Seasonal changes in the community obtained by the traps and a relationship between phylogenetic distance of host plants and community similarity of the beetles obtained by the bait logs were compared among the three sites. The species richness captured by the traps tended to decrease with latitude. In Thailand, beetles were captured throughout the season but not in Japan. Seasonal dissimilarity tended to be greater but annual dissimilarity tended to smaller with latitude. Changes in the community (turnover rate) was greater in Thailand than Japan, partly because of the faster life cycle duration, partly because of the more rapid changes in the breeding material, as a result of higher average temperatures. Beetles have to disperse and seek out new breeding sites more frequently in Thailand than in Japan. Results of the bait log experiment also support the hypothesis. A negative correlation between the phylogenetic distance between host plants and similarity in the beetle community was stronger in Japan. The community tended to be more equivalent with latitude.

Mixed plantation and insect herbivory across a harvesting gradient in North Patagonian forest

Marcos Nacif¹, Lucas Garibaldi¹, Carolina Quintero¹

¹UNRN-IRNAD, S.C. de Barilche, Argentina (mnacif@unrn.edu.ar; lgaribaldi@unrn.edu.ar; quintero.carolina@gmail.com)

Sustainable forest management should optimize tree productivity and biodiversity conservation. However, it is unknown how different tree species and their associated herbivores respond to a gradient of forest extraction or if exists an optimum harvesting level for plant performance and herbivore guild diversity. In an experimental management program in Patagonian shrublands, were planted *Austrocedrus chilensis*, *Nothofagus alpina*, *N. pumilio*, *N. antarctica*, *N.*

dombeyi and *N. obliqua*, in plots with different harvesting intensities. Plant survival, growth and leaf damage of herbivore guilds were measured. Mixed model effects were used. The plants survived more and grew better at intermediate harvesting intensities. Two groups of plants presented similar consumption patterns, coincidentally with their phylogenetic proximity. These responses were obtained with different guilds. *N. obliqua* and *N. alpina* were more consumed at intermediate harvesting intensities, and *N. pumilio*, *N. antarctica* and *N. dombeyi* were more consumed at lower harvesting intensities. A non-deciduous species was the less consumed (*N. dombeyi*). Diversity patterns are similar to herbivory rates (not for *N. dombeyi* in the second year). Intermediate harvesting is optimal for plant performance and herbivore guild diversity. In a productive forest scenario, harvesting is necessary, also ensure herbivore guild diversity.

D7p: FOREST HEALTH

Silver nanoparticles stimulate the formation of ectomycorrhizae in seedlings of pedunculate oak (*Quercus robur* L.)

Marta Aleksandrowicz-Trzcinska¹, Jacek Olchowik², Marcin Studnicki³, Alexander Urban⁴

¹Department of Forest Protection and Ecology, Faculty of Forestry, Warsaw University of Life Sciences, Warsaw, Poland; ²Department of Plant Pathology; Faculty of Horticulture, Biotechnology and Landscape Architecture; Warsaw University of Life Sciences, Warsaw, Poland; ³Department of Experimental Design and Bioinformatics, Faculty of Agriculture and Biology, Warsaw University of Life Sciences, Warsaw, Poland; ⁴Department of Botany and Biodiversity Research, Faculty of Life Sciences, University of Vienna, Vienna, Austria (marta_aleksandrowicz_trzcinska@sggw.pl; jacek_olchowik@sggw.pl; marcin_studnicki@sggw.pl; alexander.urban@univie.ac.at)

Metal nanoparticles are gaining ever-wider application in agriculture and forestry, as alternatives to chemical agents used as fertilisers, growth stimulators and pesticides, establishing a need for eco-toxicological risk assessment of these agents. We tested the effects of foliar-applied silver nanoparticles (AgNPs) on chlorophyll a fluorescence and on abundance and species composition of ectomycorrhizal (ECM) colonisation. The application of AgNPs at concentrations of 5, 25 and 50 ppm was found to stimulate the formation of mycorrhizae in seedlings of pedunculate oak, with the highest effect at intermediate concentrations (25 ppm). There were non-linear effects on the relative abundance of ECM fungal species. The proportion of dominant *T. terrestris* was highest in the control group, whereas the shares of ECM formed by the two other species, *S. brunnea* and *P. involutus*, were higher in the treatments with intermediate and maximal concentrations of AgNPs, respectively. Maximum quantum yield of photosystem II (Fv/Fm) assessed by chlorophyll a fluorescence measurements revealed slight debilitation of oak seedlings irrespective of the application of AgNPs and their concentrations. This result offered an indirect indication that photosynthesis capacity had no influence on the level of mycorrhization. We hypothesise that foliar AgNPs treatments at concentrations below thresholds of acute toxicity and in the absence of significant effects on chlorophyll a fluorescence may still exert significant influence on biotic interactions including mycorrhizal symbioses by impacting plant hormonal balance, particularly ethylene, and regulatory pathways involved in host control of ECM colonisation.

Biochemical characterization of bacterioses diseases in nurseries and plantations of *Eucalyptus* spp.

Daniella Flávia Said Heid Schettini Silva¹, Helena Piedade Farsoni¹, Sharlles Christian Moreira Dias², Anderson Jones Bobko², Luciano Flávio Neves Ramos², Celso Luis Marino³, Edson Luiz Furtado¹

¹Departament of Plant Protection, São Paulo State University, Botucatu, Brazil; ²Eldorado Brasil Company, Três Lagoas, Brazil; ³Departamento of Genetics, São Paulo State University, Botucatu, Brazil (daniellaflaviaschettini@gmail.com; helenap_farsoni@hotmail.com; sharlles.dias@eldoradobrasil.com.br; anderson.bobko@eldoradobrasil.com.br; luciano.ramos@eldoradobrasil.com.br; cl.marino@unesp.br; edson.furtado@unesp.br)

Brazil is a world reference in eucalyptus production due to its action based on sustainability, competitiveness and innovation. Accordingly, factors that affect production, such as diseases caused by pathogenic biotic agents, including those of fungal and bacterial origin, need to be studied. Bacteria encompass a group of pathogens of complex morphological differentiation, requiring studies to characterize them. Among the methods for separating bacterial groups, the biochemical characterization allows to distinguish these according to their characteristics, such as types of respiration, production of specific enzymes or carbohydrates, among others. Thus, 39 pathogenic isolates obtained through eucalyptus seedlings with symptoms of die-back and wilting and lesions on the branches, petiole and midrib were evaluated biochemically, in order to evaluate the pathogen group. Consequently, these isolates were submitted to the tests proposed by Schaad (2001), such as potassium hydroxide or Gram test (positive or negative), oxidation and fermentation test, hypersensitivity to tobacco (*Nicotiana tabacum*), pectinolytic enzyme production, reductive phosphatase activation, reduction of nitrate to nitrite, production of carbohydrates from mannitol and production of catalase. Therefore, the tests demonstrated the bacterium is Gram negative, that is, pathogenic. In addition, the results of the tests of the oxidation and fermentation, reductive phosphatase, nitrate to nitrite reduction, mannitol and catalase were positive and for pectinolytic enzyme production and hypersensitivity to tobacco were negative, indicating the isolates belong to the group of the Enterobacteria.

Parasitism of three species of eulophid gall wasps by eupelmid, eulophid, eurytomid, and torymid on *Eucalyptus* (Myrtaceae) commercial plantations in Sumatra, Indonesia

Wagner Tavares¹, Srikumar Kkadan¹, Ade Hendrik¹, Marthin Tarigan¹, Jupiter Abad², Álvaro Durán¹

¹Asia Pacific Resources International Holdings Ltd., Pangkalan Kerinci, Indonesia; ²Toba Pulp Lestari, Porsea, Indonesia (wagnermaias@yahoo.com.br; sreeku08@gmail.com; ademeizon9@gmail.com; marthin_tarigan@aprilasia.com; jupiter_abad@tobapulp.com; duransandoval@gmail.com)

Eulophid gall wasps are a threat to the *Eucalyptus* (Myrtaceae) commercial plantations around the world. The objective of this study was to identify species of gall wasps and their associated parasitoids besides the parasitism level on galls collected from commercial *Eucalyptus* plantations in Sumatra, Indonesia. The gall wasps recovered were *Leptocybe invasa* Fisher & La Salle (Tetrastichinae), *Ophelimus eucalypti* (Gahan) and *Ophelimus maskelli* (Ashmead) (Ophelminae), all belonging to the family Eulophidae. The parasitoid *Megastigmus* Dalman (Torymidae: Megastigminae) emerged from the galls of *L. invasa*; *Aprostocetus* Westwood (Tetrastichinae), *Chrysonotomia* Ashmead, *Closterocerus chamaeleon* (Girault) (Entedoninae), *Quadrastichus* Girault (Tetrastichinae: Eulophidae), *Eupelmus* Dalman (Eupelmidae: Eupelminae), *Eurytoma* Illiger (Eurytomidae: Euritominae), and *Megastigmus* from the galls of *O. eucalypti*; and *C. chamaeleon* and *Megastigmus* from the galls of *O. maskelli*. The parasitism on *O. eucalypti* and *O. maskelli* was 30.23 and 100.00%, respectively. *Closterocerus chamaeleon*, native to Australia, shows the ability to parasitize the galls of both *Ophelimus* species therefore with a greater parasitism level on *O. maskelli*, and *Megastigmus* parasitizes all gall wasp species. As far as is known, no activity of artificial introduction of parasitoids of *Eucalyptus* gall wasps was conducted in Indonesia so far, indicating a natural introduction of parasitoids or origin of some of them to Sumatra and adaptation to parasitize the introduced gall wasp species. The maintenance of parasitoid species, combined with the selection of resistant and tolerant plant genotypes are management measures being currently adopted to control the *Eucalyptus* gall wasps in Sumatra, Indonesia.