



*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 Pova 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**

em cinco espaçamentos na idade de 8 anos. O experimento foi desenvolvido na Estação Experimental do Instituto Agronômico de Pernambuco (IPA) em Araripina que apresenta uma temperatura média anual de 25 °C e precipitação média anual é de aproximadamente 750 mm, com concentração de 70% entre os meses de dezembro a março. Durante o período experimental a precipitação média anual foi 529.4 mm, concentrada nos meses de janeiro a abril, o que configura uma mudança temporal severa e faz dessa década uma das mais secas da história. A taxa de sobrevivência média do experimento foi de 90%, constatando-se diferenças significativas entre os clones, sendo o C11 no espaçamento 3 m x 3 m o que apresentou maior taxa de sobrevivência 98.40%. Pelo teste de Scott-Knott ( $p < 0.05$ ) os tratamentos foram divididos em três grupos sendo o espaçamento 2 m x 1 m o que apresentou as menores taxas de sobrevivência. Mesmo em condições climáticas severas os clones de eucaliptos conseguem se desenvolver e apresentam baixo índice de mortalidade.

## C11: MIXED-SPECIES FORESTS AND PLANTATIONS: KNOWLEDGE GAPS AND RESEARCH PRIORITIES

### Mixed settlements of *eucalyptus* and acacia in transition area between Brazilian Savana (Cerrado) and Amazon Forest biomes

Diego Camargo<sup>1</sup>, Maurel Behling<sup>2</sup>, Jean-Pierre Daniel Bouillet<sup>3</sup>, Ivanka Rosada de Oliveira<sup>4</sup>, José Leonardo de Moraes Gonçalves<sup>4</sup>, Murilo Campos Pereira<sup>1</sup>  
<sup>1</sup>Universidade Federal do Mato Grosso, Sinop, Brasil; <sup>2</sup>Embrapa Agrossilvopastoral, Sinop, Brasil; <sup>3</sup>CIRAD, Piracicaba, Brasil; <sup>4</sup>Escola Superior de Agricultura "Luiz de Queiroz", Universidade de São Paulo, Piracicaba, Brasil (camargo.die@gmail.com; maurel.behling@embrapa.br; jean-pierre.bouillet@cirad.fr; ivanka.ivi@gmail.com; jlmgonca@usp.br; murilo\_camposcol@hotmail.com)

The adoption of mixed planting with eucalyptus and legume tree specie - able to fix nitrogen, is a sustainable alternative to provide nitrogen to the *eucalyptus*. Our objective was to evaluate if the mixed planting of eucalyptus and acacia yields basal area equivalent to homogeneous eucalyptus planting. The treatments evaluated were: *Eucalyptus* (E, clone I144 - *E. urophylla* x *E. grandis*) with and without nitrogen fertilization (0A: 100E + N e 0A: 100E-N), acacia (A, *Acacia mangium*) (100A: 0E), acacia and eucalypt ratio 1:2 (33A: 67E) and 1:1 (50A: 50E). Randomized blocks design (RBD) was used, with four replicates and plot with 1,296 m<sup>2</sup> (12 x 12 trees) and 576 m<sup>2</sup> of useful area (double surround, with spacing 3 x 3 m). The trees were measured at three years of age by circumference at breast height (CBH) and basal area (BA, m<sup>2</sup> ha<sup>-1</sup>). BA was different among treatments ( $p < 0.000$ ), the higher was in homogeneous acacia planting (14.5 m<sup>2</sup> ha<sup>-1</sup>). The mixed planting was no different from the eucalyptus homogeneous fertilized with N ( $p > 0.35$ , in both acacia represented 60% and 84% of the BA for 1:2 and 1:1 ratio between eucalyptus and acacia. The interspecific competition was positive for acacia and negative for eucalyptus.

### Developing founding forest species in a disturbed area within the city of Rio Branco, Acre, Brazil, after three decades of age / Desenvolvimento de essências florestais plantadas em uma área alterada na cidade de Rio Branco-Acre após três décadas de idade

Harley Araújo da Silva<sup>1</sup>, Veronica Telma da Rocha Passos<sup>1</sup>, Thiago Augusto da Cunha<sup>2</sup>  
<sup>1</sup>Universidade Federal do Acre, Parque Zoológico, Rio Branco, Brasil; <sup>2</sup>Universidade Federal do Acre, Centro de Ciências Biológicas e da Natureza, Rio Branco, Brasil (harleyaraujo@ufac.br; veronica.passos@ufac.br; etsfor@yahoo.com)

Poucas são as experiências de plantios florestais na Amazônia com idade avançada e que reúnam grande número de espécies arbóreas, como é o caso do Experimento Arboreto, localizado no Parque Zoológico da Universidade Federal do Acre. Nesse caso, em duas áreas de 1,38 ha cada, foram plantados indivíduos de 138 espécies diferentes no espaçamento de 2,5 m x 2,5 m, sendo a roçagem e coroamento os únicos tratamentos silviculturais aplicados. Buscando saber o estado atual das espécies, trinta e cinco anos após o plantio foi realizado o censo dos indivíduos plantados, bem como mensuração de variáveis dendrométricas como o diâmetro à altura do peito (DAP) e a altura total (Ht). Das espécies plantadas, 59 apresentam indivíduos vivos merecendo destaque a palmeira *Syagrus sancona* e *Handroanthus serratifolius* por apresentarem sobrevivência acima de 75%. Espécies como *Annona montana*, *Aspidosperma vargasii*, *Ceiba samauma*, *Couepia bracteosa*, *Dalbergia inundata*, *Hymenaea courbaril*, *Hymenaea parvifolia* e *Simira rubescens* apresentaram taxas regulares de sobrevivência, variando entre 50% e 69%. Essências comumente usadas pelo mercado madeireiro como *Aspidosperma vargasii*, *Cedrela odorata*, *Dipteryx odorata*, *Hymenaea courbaril* e *Hymenaea parvifolia* se destacaram perante as demais por apresentarem médias de DAP com valores variando entre 26 cm e 31 cm, e Ht entre 17 m e 19 m. A importância desse trabalho reside na necessidade de, passados 35 anos do plantio, se determinar quais espécies melhor se adaptaram em uma área onde foram aplicados os tratamentos silviculturais mais básicos ao pleno desenvolvimento das mudas.

### Integrating the intra- and inter-species-groups competition effects into an individual diameter at breast height growth model for mixed-species forests in Mexico

Geronimo Quíñonez Barraza<sup>1</sup>, Dehai Zhao<sup>2</sup>, Héctor Manuel de los Santos Posadas<sup>3</sup>, José Javier Corral Rivas<sup>4</sup>  
<sup>1</sup>Campo Experimental Valle del Guadiana, Instituto Nacional de Investigaciones Forestales Agrícolas y Pecuarias, Durango, DGO, Mexico; <sup>2</sup>Warnell School of Forestry and Natural Resources, University of Georgia, Athens, GA, USA; <sup>3</sup>Postgrado en Ciencias Forestales (quinonez.geronimo@inifap.gob.mx, dzhao@warnell.uga.edu, hmsantos@colpos.mx, jcorral@ujed.mx)

The forest management-planning in Northwest of Durango, Mexico involve mixed-species stands and the selection method is normally applied for uneven-aged stands in such forests. An individual distance-dependent model without age was used to evaluate the diameter at breast height (dbh) growth and neighborhood effects for four species groups in mixed-species stands. The dataset considers 44 stem-mapped re-measurement plots and twenty-two species were grouped as: *Pinus* (seven species), other conifers (three species), other broadleaves (four species) and *Quercus* (eight species). Four methods were used to select neighboring trees, 12 distance-dependent competition indices were computed, and the con-group and hetero-group neighborhood effect were carried out for species groups. The dbh growth model was fitted separately under the assumptions of no-competition effect (without competition term), equivalent and nonequivalent neighborhood effects. The dbh growth models under the assumption of nonequivalent neighborhood effect outperformed the models under the assumptions of equivalent neighborhood effect and without competition effect. The intra-species-group competition negatively affect the diameter growth for all species groups, except for the *Quercus* group. In all cases, the fitted age-independent dbh growth models showed a good of fit to the stem-mapped plots data with adjusted coefficient of determination values larger than 0.97 and root mean square error values smaller than 1.33 cm. The growth models can be used to predict the dbh growth for the species groups in mixed-species forests.