53rd ATBC 2016

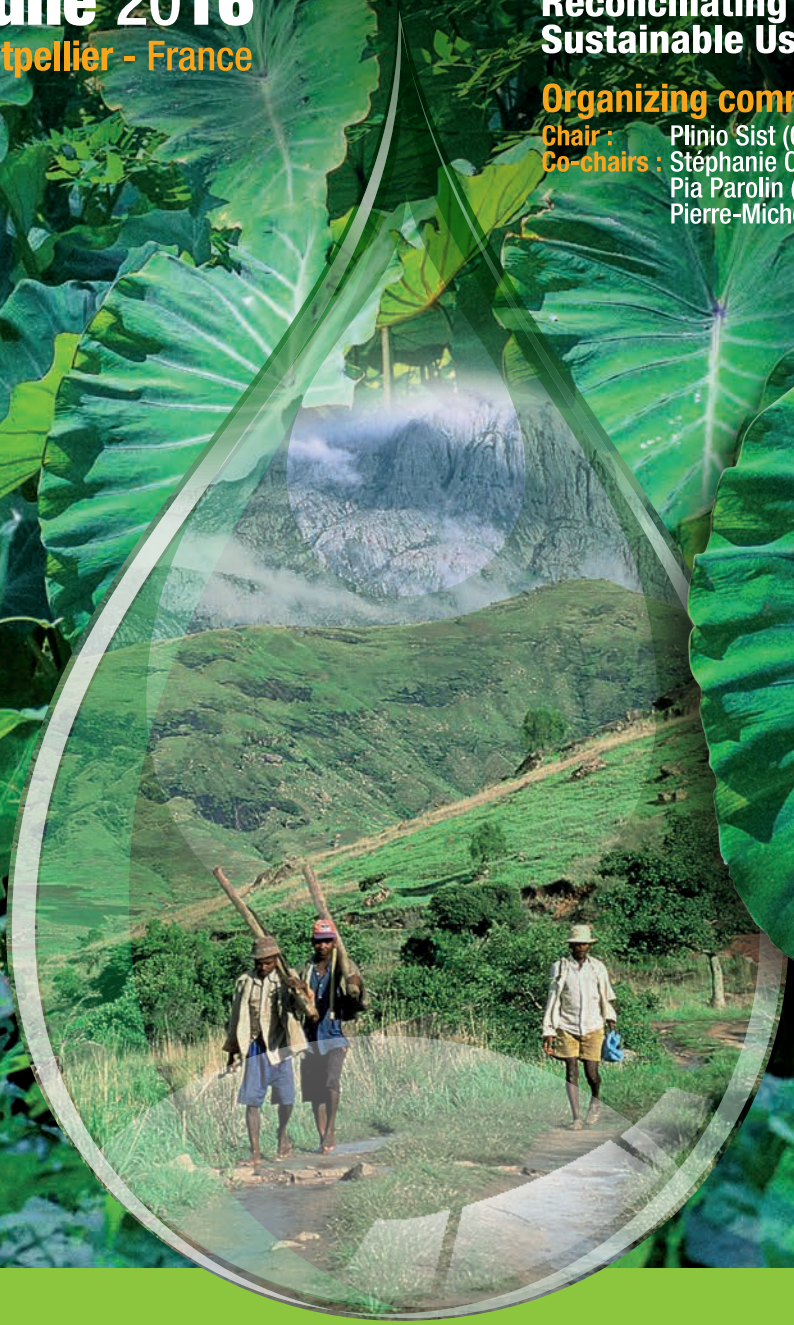
Annual Meeting of the Association for Tropical Biology and Conservation

19-23 June 2016
Le Corum, Montpellier - France

Tropical Ecology and Society
Reconciliating Conservation and Sustainable Use of Biodiversity

Organizing committee :

Chair : Plinio Sist (CIRAD)
Co-chairs : Stéphanie Carrière (IRD)
Pia Parolin (INRA)
Pierre-Michel Forget (MNHN, CNRS-INEE)



PROGRAM & ABSTRACTS

www.atbc2016.org

Association for Tropical Biology and Conservation

cirad

IRD Institut de recherche pour le développement

INRA SCIENCE & IMPACT

MUSÉUM NATIONAL D'HISTOIRE NATURELLE

cnrs

CIFOR

CONGRESS OFFICE
HOPSCOTCH CONGRÈS
23/25, rue Notre-Dame des Victoires
75002 Paris | France
www.hopscotchcongres.com

O2-03 – S2 *Success of tropical legumes and traits that contribute to their dominance*
Monday 20 June 20 / 11:00-15:30 – Einstein

Temporal diversity dynamics of mimosoid legumes, a key ecological component of global tropical biomes

ERIK KOENEN[1], KYLE DEXTER[2], JENS RINGELBERG[1], ELVIA DE SOUZA[3], PRISCILLA DE ALMEIDA[4], JOÃO IGANCI[5], PÉTALA RIBEIRO[4], MARCELO SIMON[6], VANESSA TERRA[7], DONOVAN BAILEY[8], JAMES BOATWRIGHT[9], GILLIAN BROWN[10], JAVIER AJU[11], MICHELLE VAN DER BANK[12], JOE MILLER[13], LUCIANO DE QUEIROZ[4], TOBY PENNINGTON[14], COLIN HUGHES[1]
[1]University of Zurich, Institute of Systematic Botany, 8008, Zurich, Switzerland
[2]University of Edinburgh, School of Geosciences, EH9 3FE, Edinburgh, United Kingdom
[3]Universidade do Estado da Bahia, Departamento de Educa, 48608-240, Paulo Afonso, Brazil
[4]Universidade Estatal Feira de Santana, Departamenta de Ciências Biológica, 44036-900, Feira de Santana, Brazil
[5]Universidade Federal do Rio Grande do Sul, Instituto de Biociências, Departamento de Botânica, 91501-970, Porto Alegre, Brazil
[6]Empresa Brasileira de Pesquisa Agropecuária (Embrapa), Parque Estação Biológica, 70770-901, Brasilia, Brazil
[7]Universidade Federal de Uberlândia, Instituto de Ciências Agrárias, 38400-902, Uberlândia, Brazil
[8]New Mexico State University, Department of Biology, 88003, Las Cruces NM, USA
[9]University of the Western Cape, Department of Biodiversity and Conservation Biology, 7535, Bellville, Republic of South Africa
[10]Queensland Herbarium, Department of Science, Information Technology and Innovation, 4066, Brisbane, Australia
[11]University of Melbourne, School of Biosciences, 3010, Victoria, Australia
[12]University of Johannesburg, African Centre for DNA Barcoding, 2006, Auckland Park, Republic of South Africa
[13]National Science Foundation, Division of Environmental Biology, 22230, Arlington VA, USA
[14]Royal Botanic Gardens Edinburgh, Department of Science, EH3 5LR, Edinburgh, United Kingdom

Background – The mimosoid legumes (Leguminosae-Mimosoideae) are a pantropically distributed clade of c. 3300 species of large rainforest trees and lianas, savanna and seasonally dry forest trees and shrubs, and creeping and geoxylic fire-adapted subshrubs. They occupy a wide ecological amplitude spanning the whole lowland tropics and often constitute abundant or dominant elements in tropical rain forests, seasonally dry forests and savannas. Here we analyse the temporal origins and evolutionary dynamics of extant mimosoid diversity in modern tropical biomes, to gain insights into the origins of tropical biodiversity.
Methods – We construct the largest phylogeny for the group to date by adding densely sampled phylogenetic trees of subclades in a hierarchical fashion onto a well-resolved time-calibrated backbone phylogeny based on Next-Generation Sequencing (NGS) of plastid and nuclear genes. We correct for unsampled diversity by simulation and estimate speciation, extinction and net diversification rates across the phylogeny.
Results – While the clade dates back to at least the Early Eocene, most of the extant diversity is derived from later episodes of diversification from the Early Miocene onwards. Exceptionally high diversity is found in the genus Mimosa (c. 550 spp.) and in a large clade comprising the tribes Ingeae and Acacieae p.p. (c. 2000 spp.), which includes multiple nested radiations.
Discussion – We propose that the temporal diversity dynamics of mimosoid legumes are best explained by punctuated extinction and radiation, which leads to episodic species turnover through time. Our findings are important for a general understanding of the temporal assembly of floras, and indeed whole biotas across – and perhaps beyond – the global tropics.

O2-04 – S2 *Success of tropical legumes and traits that contribute to their dominance*
Monday 20 June 20 / 11:00-15:30 – Einstein

Tropical dry forest legumes aren't just different—they are better

Jennifer Powers[1], Erick Calderon[2], Maria Gabriela Gei[1], Christina Smith[1], German Vargas-G[1], Bonnie Waring[1]
[1]University of Minnesota, Ecology, Evolution & Behavior and Plant Biology, 55108, Saint Paul, USA
[2]Universidad Nacional, Escuela de Ciencias Biológicas, 86-3000, Heredia, Costa Rica

Background: Trees and lianas from the family Fabaceae are abundant and diverse in many Neotropical dry forests. Possible explanations for this pattern include biogeographic factors and/or traits that allow legumes to flourish under conditions of highly seasonal water availability. While it is well established that legumes typically have higher foliar nitrogen concentrations compared to co-occuring taxa, it is also possible that they differ in other ways. We asked whether legumes have traits that confer competitive advantages in tropical dry forest in northwestern Costa Rica, where legumes comprise ~18% of trees.
Methods: We used shadehouse experiments to compare germination, growth, morphology, and physiology of a large number of tropical dry forest legume tree and liana species to diverse, co-occurring non-legume species. In three experiments we manipulated germination treatment, light and soil conditions, or water and/or nutrient additions to compare legumes to non-legumes across a range of environmental conditions.
Results: In a germination experiment, legume seeds from 9 species germinated twice as fast and had higher final percentages than 25 non-legume species. Legume tree seedlings in a pot experiment with two light levels (25 and 50% full sun) on two soil types (fertile, wet soil versus infertile, dry soil) had higher height growth rates and final biomass, and were more responsive to light availability than 14 species of non-legumes from 11 different families. To distinguish whether soil water or nutrients are more important for early performance of legumes and non-legume seedlings, we grew four species of each in a common soil, and pots received added nutrients, water, both, or no additions. Photosynthetic rates of legumes were twice those of non-legumes, while transpiration rates increased with water addition, but did not differ between legumes and non-legumes. Height growth in legumes was much more responsive to added nutrients or nutrients plus water, compared to the non-legume taxa.
Discussion: These studies suggest that legumes have a distinct regeneration niche in this forest. They germinate and grow quickly. This initial height advantage is maintained over time. Moreover, legume seedlings are more responsive to variations in light, soil moisture, and soil nutrients compared to non-legumes. This may be an adaptive strategy in tropical dry forests, where resource availability varies dramatically between wet and dry seasons.