**Dr. Gerardo Avalos (avalos@fieldstudies.org)**

**Ph.D. University of Missouri-St. Louis (August 1999)**



Full Professor of Tropical Ecology (Catedrático), University of Costa Rica

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<https://www.researchgate.net/profile/Gerardo_Avalos>

<https://scholar.google.com/citations?user=d8p9nygAAAAJ&hl=en>

**RESEARCH PROGRAM**. Physiological adaptations of tropical plants to spatial and temporal changes in the availability of light. Physiological ecology of lianas. Biomechanics of tropical palms. Ecology of extraction of tropical organisms. Effects of fragmentation on neotropical birds. Functional ecology of hummingbirds. Tropical ecology and conservation. Multivariate statistics applied to ecological problems.

**EDUCATION**

Bachelor in Biology, University of Costa Rica. (April 9, 1991).

PhD student in the department of Organismic, Population and Environment Biology (EPOB) at the University of Colorado in Boulder (1992-1993).

Master's degree in biology from the University of Missouri-St. Louis, May 1996.

PhD in Tropical Biology and Conservation, Department of Biology, University of Missouri-St. Louis, August 1999. Thesis: "Photosynthetic acclimation of canopy branches and seedlings of lianas to light changes in a tropical dry forest." Graduate work done at the Smithsonian Tropical Research Institute using the canopy crane system, Panama.

**ACADEMIC POSITIONS**

Director, Center for Sustainable Development Studies, The School for Field Studies, Costa Rica (2007-present).

Full Professor of Tropical Ecology, University of Costa Rica, UCR (1991-present).

Research Fellow, Smithsonian Tropical Research Institute, 1995-1999.

Professor of Tropical Ecology, The School for Field Studies, Center for Sustainable Development Studies (2001-2007).

Professor, EARTH University (May-August 1999, 2000, 2001)

Academic Coordinator, Program in Tropical Ecology and Conservation (World Class), UCR (1998-2001)

Visiting Professor, Department of Botany, University of Ulm, Germany (June 2001)

Visiting Professor, Center for Environmental Studies, University of Redlands, California (June-July 2006; training at ESRI on Geodatabase Design and Geographic Information Systems using ARCGIS 9).

Visiting scientist, Los Amigos Biological Station, CICRA, Madre de Dios, Peru (July 2010).

Handling Editor of the Editorial Board of Oecologia, Ecophysiology (2009-present).

Member of the Scientific and Conservation Committees, Association of Tropical Biology and Conservation (ATBC) for the meetings in Costa Rica 2013.

Member of the Academic Advisory Committee of The School for Field Studies (2013-present).

**LANGUAGES**

Native: Spanish.

English: fluency reading, writing and speaking.

French: fluency in reading.

**PUBLICATIONS**

1. **Avalos**, G., S.S. Mulkey and S.J. Wright. 1994. Assessment of the effects of microsite factors on liana physiology. p. 35-37. In: S.J. And M. Wright Colley (eds). Accessing the canopy: assessment of biological diversity and microclimate of the Tropical Forest Canopy: Phase 1. United Nations Environmental Program, 84 pp.

2. **Avalos**, G. 1999. Photosynthetic acclimation of canopy branches and seedlings of lianas to light changes in a tropical dry forest. Ph.D. dissertation, University of Missouri-St. Louis.

3. **Avalos**, G. and S.S. Mulkey. 1999. Photosynthetic acclimation of the liana *Stigmaphyllon lindenianum* to light changes in a tropical dry forest canopy. Oecologia 120: 475-484.

4. **Avalos**, G. and S.S. Mulkey. 1999. Seasonal changes in liana cover in the upper canopy of a neotropical dry forest. Biotropica 31 (1): 186-192.

5. **Avalos**, G., S.S. Mulkey and K. Kitajima. 1999. Leaf optical properties of trees and lianas in the outer canopy of a tropical dry forest. Biotropica 31 (3): 517-520.

6. **Avalos**, G. 2004. Production of second set of roots still in Iriartoid palms: a solution to the puzzle. Palms 48 (2): 83-85.

7. **Avalos**, G and S.S. Mulkey. 2005. Photochemical efficiency of adult and young leaves in the neotropical understory shrub *Psychotria limonensis* (Rubiaceae) in response to changes in the light environment. Revista de Biologia Tropical 52 (4): 839-844.

8. **Avalos**, G., D. Salazar & A. Araya. 2005. Stilt Root Structure in the Neotropical Palms *Iriartea deltoidea* and *Socratea exorrhiza*. Biotropica 37 (1): 44-53.

9. **Avalos**, G. 2005. Banded-tailed Pigeon (*Columba fasciata*) at low elevations in Braulio Carrillo National Park, Costa Rica. Neotropical Ornithology 16: 1-2.

10. **Avalos**, G., K. Hoelle, J. Gardner, S. Anderson and C. Lee. 2006. Impact of the invasive species *Syzygium jambos* (Myrtaceae, Rose Apple) on patterns of understory seedling abundance in a Tropical Forest Premontane, Costa Rica. Revista de Biologia Tropical 54 (2): 414-421.

11. Chaves, O. and G. **Avalos**. 2007. Is the inverse leafing phenology of the dry forest understory shrub *Jacquinia nervosa* (Theophrastaceae) a strategy to escape herbivory? Revista de Biologia Tropical 54 (3): 951-963.

12. **Avalos**, G. 2007. Changes in size preference of illegally extracted heart of palm from *Euterpe precatoria* (Arecaceae) in Braulio Carrillo National Park, Costa Rica. Economic Botany 61 (1): 96-98.

13. **Avalos**, G., S.S. Mulkey, K. Kitajima & S.J. Wright. 2007. Colonization strategies of two liana species in a tropical dry forest canopy. Biotropica 39 (3): 393-399.

14. Alvarez, S. & G. **Avalos**. 2007. Light interception efficiency of the understory palm *Calyptrogyne ghiesbreghtiana* under deep shade conditions. Ecotropica 13: 1-8.

15. **Avalos**, G. 2007. Book comment for the journal Revista de Biologia Tropical: Kapelle, M. & S. P. Horn. 2005. Páramos of Costa Rica. Editorial INBio, Santo Domingo, Heredia, Costa Rica. 767 pp. Vol 55 (2): 743-744, June 2007.

16. **Avalos**, G. 2007. Book comment for the journal Ecotropica: Kapelle, M. & S. P. Horn. 2005. Páramos of Costa Rica. Editorial INBio, Santo Domingo, Heredia, Costa Rica. June 2007.

17. Chaves, O. & G. **Avalos**. 2008. Do seasonal changes in light availability influence the inverse leafing phenology of the neotropical dry forest understory shrub *Bonellia nervosa*? Revista de Biologia Tropical 56 (1): 257-268.

18. Sylvester, O. & G. **Avalos**. 2009. Illegal Palm Heart (*Geonoma edulis*) Harvest in Costa Rican National Parks: Patterns of Consumption and Extraction. Economic Botany 63(2): 179-189.

19. **Avalos**, G. and M. Fernández. 2010. Allometry and stilt root structure of the Neotropical palm *Euterpe precatoria* (Arecaceae) across sites and successional stages. American Journal of Botany 97(3): 1-8.

20. **Avalos**, G. & O. Sylvester. 2010. Allometric estimation of total crown leaf area in the neotropical palm *Euterpe oleracea*. Trees: structure and function 24(5): 969-974. Included in the special issue of TREES on Empirism and Modeling in 2014.

21. Vargas, LE, Sánchez, NV & G **Avalos**. 2011. Forest structure and territory size relationship in the neotropical understorey insectivore *Henicorhina leucosticta*. Journal of Tropical Ecology 27:65–72.

22. **Avalos,** G., & Schneider, A. R. 2011. Quantification of ramet production in the Neotropical palm Euterpe precatoria (Arecacea) in Costa Rica. Ecotropica, 17, 31-38**.**

23. **Avalos**, G., A. Soto & W. Alfaro. 2012. Effect of artificial feeders on pollen loads of the hummingbirds of Cerro de La Muerte, Costa Rica. Revista de Biología Tropical 60(1): 65-73.

24. Sylvester, O., G. **Avalos** & N. Cháves-Fernández. 2012. Notes on the Ethnobotany of Costa Rica´s palms. Palms 56(4): 190-201.

25. Seas-Carvajal, C. & G. **Avalos**. 2013. Distribution of bioluminescent fungi across old-growth and secondary forests in a tropical rain forest in Costa Rica. Revista de Biología Tropical 61(2): 1-7.

26. **Avalos**, G., M. Fernández-Otárola & J.T. Engeln. 2013. Successional stage, fragmentation, and exposure to extraction influence the population structure of *Euterpe precatoria* (Arecaceae). Revista de Biología Tropical 61(3): 1415-1424.

27. Sylvester, O. & G. **Avalos**. 2013. Influence of light conditions on the allometry and growth of the understory palm *Geonoma undata* subsp. *edulis* (Arecaceae) of neotropical cloud forests. Am. J. Bot. 100(12): 1-7.

28. Celis, G. & G. **Avalos**. 2013. Acclimation of seedlings of *Gnetum leyboldii* Tul. (Gnetaceae) to light changes in a tropical rain forest. Revista de Biología Tropical 61(4): 1859-1868.

29. Sánchez, N.V., L.E. Vargas-Castro, G. **Avalos** & F. Paniagua. 2014. Effect of prey availability on the abundance of White-breasted Wood-Wrens, insectivorous birds of tropical lowland forests. Journal of Field Ornithology 85(4): 347-354.

30. Fernández-Otárola, M. & G. **Avalos**. 2014. Demographic variation across successional stages and their effects on the population dynamics of the neotropical palm *Euterpe precatoria*. Am. J. Bot. 101 (6): 1023-1028. doi:10.3732/ajb.1400089

31. **Avalos**, G. & S. S. Mulkey. 2014. Photosynthetic and morphological acclimation of seedlings of tropical lianas to changes in the light environment. Am. J. Bot. 101(12). doi: 10.3732/ajb.1400127

32**. Avalos**, G. 2015. Highest elevational record of the Long-billed Hummingbird (*Phaethornis longirostris Delattre, 19843,* Aves: Trochilidae) in Costa Rica. Brenesia 83-84: 89-90.

33. **Avalos**, G., M. Cambronero & O. Vargas. 2016. Quantifiation of browsing damage to the stilt root cone of *Socratea exorrhiza* (Arecaceae) by Collared Peccaries (*Pecari tajacu*, Artiodactyla: Tayassuidae) at La Selva, Costa Rica. Brenesia. 85-86: 30-37.

34. **Avalos**, G. 2016. Growth of the neotropical palm *Euterpe precatoria* Mart. in an agroforestry system in Costa Rica. Brenesia. 85-86: 1-8.

35. **Avalos**, G. & E. Bermúdez. 2016. Effect of a major highway on the spatial and temporal variation in the structure and diversity of the avifauna of a tropical premontane rain forest. Revista de Biologia Tropical 64(4): 1383-1399.

36. Ley, J.M., G. **Avalos** & E. Chacón-Madrigal. 2016. Seedling growth and survival of five tree species in secondary forests and adjacent pastures in the montane rain forests of southern Costa Rica. Revista de Biologia Tropical. 64(4): 1565-1583.

37. Goldstein, G., L. S. Santiago, P.I. Campanello, **G. Avalos**, Y.J. Zhang & M. Villagra. 2016. Facing Shortage or Excessive Light: How Tropical and Subtropical Trees Adjust Their Photosynthetic Behavior and Life History Traits to a Dynamic Forest Environment. In: *Tropical Tree Physiology: Adaptations and Responses in a Changing Environment*, Springer International, Editors: Guillermo Goldstein, Louis S Santiago, pp.319-336

38. **Avalos**, G. 2016. How do forests work? Primary production, energy and forest growth. p. 17-38 In: S. Molina & Rojas, C. (eds). The Paradigm of Forests and the Survival of the Fittest. CRC Press, Florida, USA.

39. Ley-López, J.M. & **G. Avalos**. 2017. Germination patterns of the palm flora of a lowland Tropical Rainforest in Costa Rica. Tropical Conservation Science 10:1-12.

40. Häger, A. & G. **Avalos**. 2017. Do functional diversity and trait dominance determine carbon storage in an altered tropical landscape? Oecologia 184(2):569–581.

41. **Avalos**, G., A. Häger, E. Arévalo, M. Little, & K. Goodall. 2017. El Centro de Estudios sobre Desarrollo Sostenible, un modelo de educación en el extranjero con una huella positiva en Costa Rica. Ambientico 264:4-12.

42. Cambronero, M., G. **Avalos** & C. Alvarez-Vergnani. 2018. Variation in the carbon fraction of seven neotropical palm species of different forest strata. Palms 62(1): 25-34.

43. **Avalos, G**. 2018. Still searching the rich coast: Biodiversity of Costa Rica, numbers, processes, patterns, and challenges. Chapter 7 in Pullaiah, T. (editor). Global Biodiversity Volume 4: Americas. CRC Press, Florida, USA.

44. Gaurav S. Kandlikar, Marcel Vaz, Ricardo Kreibel, German Vargas, Fabián A. Michelangeli, Roberto Cordero, Frank Almeda, **Gerardo Avalos**, Ned Fetcher, Nathan J. B. Kraft. 2018. Contrasting patterns of taxonomic, phylogenetic, and functional variation along a Costa Rican altitudinal gradient in the plant family Melastomataceae. Journal of Tropical Ecology (in press).

**Ms submitted or in preparation:**

1. Rincón, Y.A., M.V. Gutiérrez, **G. Avalos** & R. Mata. Chlorophyll fluorescense response of *Vaccinium floribundum* Kunth (Ericacaceae) to seasonal changes in temperature and water availability in the páramos of Costa Rica. Trees (in rev).
2. **Avalos**, G., M.G. Gei, M. Cambronero, O. Sylvester, M. Fernández and G. Rojas. Scaling of stem diameter and height allometry in 14 neotropical palm species of different forest strata. American Journal of Botany (in rev).
3. **Avalos**, G., E. Arévalo and C. Sánchez. Spatial and temporal dynamics of the avifauna of Carara National Park, Costa Rica. The Wilson Journal of Ornithology (in rev).
4. Avalos, G., A. Soto & P. Calderón.. Effects of artificial feeders on competitive interactions and pollen loads in the hummingbirds of Cerro de La Muerte and Monteverde, Costa Rica. The Wilson Journal of Ornithology (in rev).
5. **Avalos**, G. et al. Influence of morphological and aerodynamic variation in foraging strategies Hummingbirds Monteverde Cloud Forest, Costa Rica.
6. **Avalos**, G. Shade tolerance within the context of the successional process in tropical rain forests. Revista de Biología Tropical (in rev).
7. Avalos, G. & A. Soto. Allometry for sexual size dimorphism in the hummingbirds of Costa Rica: Does Rensch’s rule apply? (in prep).

**PARTICIPATION IN CONFERENCES**

1. Avalos, G. & S.S. Mulkey. 1997. Impact of seasonal changes in light availability on the physiological adaptation of tropical lianas. Tropical Diversity: Origins, maintenance and conservation. Symposium and Annual Meeting. Association for Tropical Biology and OTS, Costa Rica San Jose June 1997.
2. Avalos, G. 1998. Effect of medium and light availability on photosynthetic acclimation of tropical lianas. VII Congreso Latinoamericano de Botánica: Diversity and Conservation of plant resources in Latin America. Mexico DF, Mexico, October 1998.
3. Avalos, G., A. Soto, J. Veenstra, T. Smith and C. Keller. 2002. Fragmentation Effects of a Major Highway on Bird Distribution in Braulio Carrillo National Park, Costa Rica. Proceedings of the Association for Tropical Biology, Panama City, Panama, June 2002.
4. Avalos, G. 2003. Spatial and temporal changes in the distribution and diversity of aquatic insects in the Braulio Carrillo National Park. IV Congreso Nacional de Biología Clodomiro Picado, San José Costa Rica.
5. Avalos, G. & E. Bermúdez. 2005. Impact of highway 32 on the bird community of the Braulio Carrillo National Park. Congress of Conservation and Wildlife Management, 21 to 25 February 2005, Universidad Nacional, Heredia, Costa Rica.
6. Avalos, G. & M. Mauricio Fernandez. 2005. Impact of illegal extraction of palm *Euterpe precatoria*. Congress of Conservation and Wildlife Management, 21 to 25 February 2005, Universidad Nacional, Heredia, Costa Rica.
7. M.G. Gei and G. Avalos. 2006. Plasticity and allometry in the Stilt root structure in 8 woody palms across successional stages and soil types at La Selva Biological Station, Costa Rica. IX Latin-American International Symposium of Botany, Santo Domingo, Domenic Republic, May 2006.
8. Participation in the workshop of The Inter-American Biodiversity Information Network (IABIN) in NBIO, Costa Rica November 20-22, 2006.
9. Participation Symposium Functional Ecology of tropical trees in the annual reunion of the Association for Tropical Ecology and Conservation in Michoacán, Mexico, July 2007.
10. Keynote speaker to the International Palm Society meeting in San José, Costa Rica, May 2008. The conference versed on the Functional Ecology of palms.
11. Participation in the Symposium on Protected Areas, San Ramon, Costa Rica, July 2008.
12. Sylvester, O. and G. Avalos. 2009. Morphology and Growth of a Harvested Cloud Forest Understory Palm in Relation to its Local Light Environment. Meeting of the Latin American Network of Botany, San Jose, Costa Rica, November 2009.
13. Avalos, G. and G. Lee. 2012. Aerodynamic and morphological variation in the highland hummingbirds of Cerro de La Muerte, Costa Rica. III Congress of Ornithology, Costa Rica. San José.
14. Avalos, G., G. Lee & A. Soto. 2013. Influence of Aerodynamics On the Dominance Hierarchy of a Hummingbird Assemblage in Costa Rica. Proceedings of the Association for Tropical Biology and Conservation, San José, Costa Rica, June 2013.
15. Hager, A. & G. Avalos. 2015. The effect of management and plant diversity on carbon storage in coffee agroforestry systems in Costa Rica. Functional diversity: linking conservation and climate change mitigation in tropical altered landscapes. Conference: 21st Annual Conference, International Society of Tropical Foresters - Conserving biodiversity across multiple use landscapes through strategic governance and land-use planning, Yale School of Forestry and Environmental Studies, New Haven, Connecticut.
16. Kandlikar, G., Carita-Vaz, M., Kriebel, R. Vargas, G., Michelangeli, F. Cordero, R., Almeda, F., **Avalos**, G., Fetcher, N., & Kraft N. J. B. 2015. High phylogenetic but low functional turnover of Melastomes along a tropical elevational gradient. 100TH Annual Meeting of the Ecological Society of America, Baltimore, Maryland.
17. Valverde-Zúñiga,N., G. **Avalos**, E. Ortiz-Malavasi, and A.E. Jiménez. 2017. Effect of habitat fragmentation on health indices of wild populations of Howler and White-faced monkeys’ in Costa Rica. International Congress for Conservation Biology, Cartagena, Colombia. July 23-27, 2017.

**Scientific Societies**

Association for Tropical Biology and Conservation (ATBC)

The International Palm Society (IPS)

Botanical Society of America (BSA)

British Ecological Society (BES)

Ecological Society of America (ESA)

Union of Costa Rican Ornithologists

Association of Costa Rican Biologists

**EDITOR OF SCIENTIFIC ARTICLES**

I am handling editor for the Ecophysiology Section of the journal Oecologia. I am part of the Editorial Board of the journal Revista de Ciencias Ambientales (UNA, Costa Rica), Botanical Sciences (formerly, Boletín de la Sociedad Botánica de México), Zeledonia (journal of the Costa Rican Ornithological Society), The Open Journal of Ecology, and Comunicaciones (El Salvador), and have edited and revised publications / proposals for the National Science Foundation as well as many times for the following journals:

1. Agronomía Costarricense
2. Agroforestry Systems
3. American Journal of Botany
4. Biological Conservation
5. Biodiversity and Conservation
6. Biotropica
7. Botanical Sciences
8. Brazilian Journal of Plant Physiology
9. Comunicaciones
10. Cuadernos de Investigación UNED
11. Diversity
12. Ecology
13. Environmental and Experimental Botany
14. Forests
15. Forest Ecology and Management
16. Journal of Environmental Management
17. Journal of Global Ecology and Environment
18. Journal of Ornithology
19. Journal of Plant Sciences
20. Journal of Tropical Engineering
21. Photosynthetica
22. Plant Ecology and Diversity
23. Oecologia
24. Revista de Biología Tropical
25. Revista de Ciencias Ambientales
26. Trees: structure and function
27. Tropical Conservation Science
28. Zeledonia

Member of the Editorial Board of Oecologia (2009-present), Plant, Botanical Sciences (Boletín de la Sociedad Botánica de México (2017-present)), the American Journal of Life Sciences (2012-present), Revista de Ciencias Ambientales (2015-present), Revista Comunicaciones (2015-present).

**Recent funding**

* Vulnerability of plant-pollinator networks of the Costa Rican Paramos in the face of Global Warming. FEES-CONARE, 2014-2016
* Establishment of nurseries of native endangered species of palms and trees in private farms along the Maquenque-Tortuguero. Biological Corridor: a mechanism to increase plant diversity and their traditional uses and reduce illegal logging. Debt-for-nature Swaps, US Department of State, INBIO, Tirimbina.
* Gaurav Kandlikar, Marcel Carita Vaz, Ricardo Kriebel, German Vargas, Fabián Michelangeli, Roberto Cordero, Frank Almeda, Gerardo Avalos, Ned Fetcher, Nathan J. B. Kraft. Evolution of functional traits in the Melastomataceae. NSF preliminary proposal.