

Knowledge of biodiversity and ecosystem services of South American mycorrhiza through research networking

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<https://southmycorrhizas.org/>



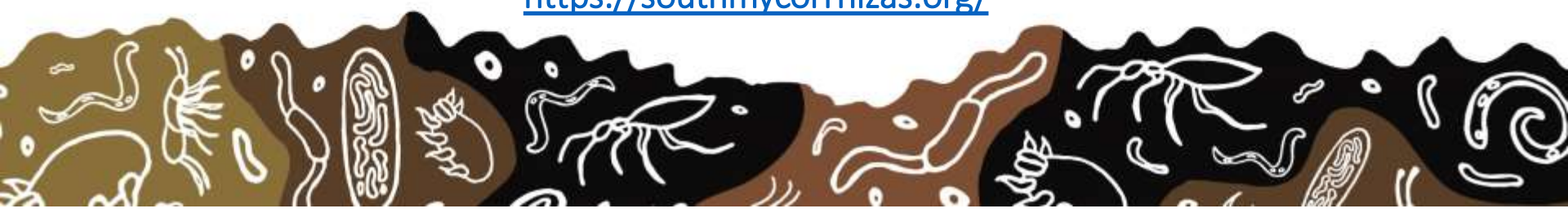
We have 249 members from 36 countries



A world map with a grid of latitude and longitude lines. Countries are colored in red or blue. Red countries include Canada, the United States, Mexico, Central American countries (Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, Panama), Caribbean islands (Cuba, Haiti, Dominican Republic, Jamaica, Trinidad and Tobago, Barbados, Guyana, Suriname, French Guiana), South American countries (Venezuela, Colombia, Ecuador, Peru, Bolivia, Paraguay, Uruguay, Argentina, Chile, Brazil, and the Falkland Islands), India, Pakistan, Bangladesh, Sri Lanka, Nepal, Bhutan, Thailand, Laos, Cambodia, Vietnam, Philippines, Malaysia, Singapore, Indonesia, Brunei, Timor-Leste, Australia, and New Zealand. Blue countries include Russia, China, North Korea, South Korea, Japan, Mongolia, Kazakhstan, Kyrgyzstan, Uzbekistan, Turkmenistan, Georgia, Armenia, Azerbaijan, Belarus, Ukraine, Poland, Czech Republic, Slovakia, Hungary, Romania, Bulgaria, Greece, Turkey, Cyprus, Israel, Jordan, Iraq, Kuwait, Saudi Arabia, Qatar, United Arab Emirates, Oman, Yemen, Oman, Afghanistan, Pakistan, India, Bangladesh, Sri Lanka, Nepal, Bhutan, Thailand, Laos, Cambodia, Vietnam, Philippines, Malaysia, Singapore, Indonesia, Brunei, Timor-Leste, Australia, and New Zealand.

Main places:
Bariloche
Córdoba
Pernambuco
Bogotá
Concepción
Temuco
Valdivia

<https://southmycorrhizas.org/>



A decorative border at the bottom of the slide featuring stylized illustrations of mycorrhizal fungi and plant roots in white and brown colors.

Bariloche
Córdoba
Pernambuco
Bogotá
Concepción
Temuco
Valdivia

Córdoba

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Concepción

Temuco

Valdivia

<https://southmycorrhizas.org/>



How the Network started?



Molecular community ecology of arbuscular mycorrhizal fungi. Valdivia, 2016.



Our first symposium, Valdivia, 2017: 8 countries, 75 participants.



A second symposium, Bariloche, 2019: 16 countries, 100 participants.



We have research/policy partners worldwide...

... and a monthly video blog

Soil BON



GLOBAL
SOIL BIODIVERSITY
INITIATIVE

A SCIENTIFIC EFFORT



GLOBAL SOIL
PARTNERSHIP



منظمة الأغذية
والزراعة للأمم
المتحدة

联合国
粮食及
农业组织

Food and
Agriculture
Organization
of the
United Nations

Organisation des
Nations Unies
pour
l'alimentation
et l'agriculture

Продовольственная и
сельскохозяйственная
организация
Объединённых
Наций

Organización de las
Naciones Unidas
para la
Alimentación y la
Agricultura



International Mycorrhiza Society



New Phytologist
Trust

<https://southmycorrhizas.org/reading/>



Why a *South American* Mycorrhizal Research Network?

- The plants, soil, and fungi of entire biomes/countries are understudied (e.g. underrepresentation on molecular databases). The distribution of mycorrhizal fungi/types is missing on many (highly diverse) ecosystems.
- No continental or multilateral funding available. Some training on sampling and molecular, bioinformatic, and statistical methods is missing.
- Still not a full integration of mycorrhizal diversity and ecosystem functions.
- We do not have a full picture of mycorrhizal applications on productive systems, and how to transfer and fund this knowledge.



Think globally, research locally:
emerging opportunities for
mycorrhizal research in South
America

First international mycorrhizal meeting in South
America, 'Mycorrhizal symbiosis in the southern cone
of South America', Valdivia, Chile, 6-9 March 2017

The topics addressed in the meeting fit broadly under two
themes: ecology of mycorrhizas and mycorrhizal applications
representing timely research directions both in the region and
globally.

Mycorrhizal fungi and plant invasions in South

C. Guillermo Bueno¹, César Marín^{2*}, Patricia Silva-Flores^{3,4}
Paula Aguilera⁵ and Roberto Godoy²

from natural, agricultural and degraded ecosystems. Results
presented at this meeting regarding these two other using field

Microbial Interactions in the plant-soil continuum:
Research results presented at the Workshop "Mycorrhizal
Symbiosis in the Southern Cone of South America"

Roberto Godoy¹, Patricia Silva-Flores², Paula Aguilera³, César Marín⁴



Meetings

Strengthening mycorrhizal
research in South America

The II International Symposium of Mycorrhizal
Symbiosis in South America, 6-8 March 2019,
Bariloche, Argentina

María Isabel Mujica^{1,2}, C. Guillermo Bueno³, Jessica
Duchicela⁴ and César Marín^{5,6*}

future directions (Table 1). Several themes emerged at this meeting
that concerned the ecological levels of organization (Fig. 2), with a
strong focus on the diversity of ectomycorrhizal (ECM) fungi, and
the potential application of arbuscular mycorrhizal (AM) fungi in
agricultural and sustainability/conservation contexts.

The ecosystem roles of ectomycorrhizal fungi on
Patagonian temperate forests



Fungal Biology

Marcela C. Pagano
Mónica Lugo *Editors*

Mycorrhizal Fungi in South America

 Springer

Chapter 4 Ectomycorrhizal Fungi in South America: Their Diversity in Past, Present and Future Research

Eduardo R. Nohra, Götz Palfner, Francisco Kuhar, Nicolás Pastor,
and Matthew E. Smith

- Similar results with both approaches.
- Similar dominant ECM lineages (*cortinarius*, *boletus*, *russula-lactarius*).
- Patagonian Nothofagaceae had (by far) the higher ECM richness.

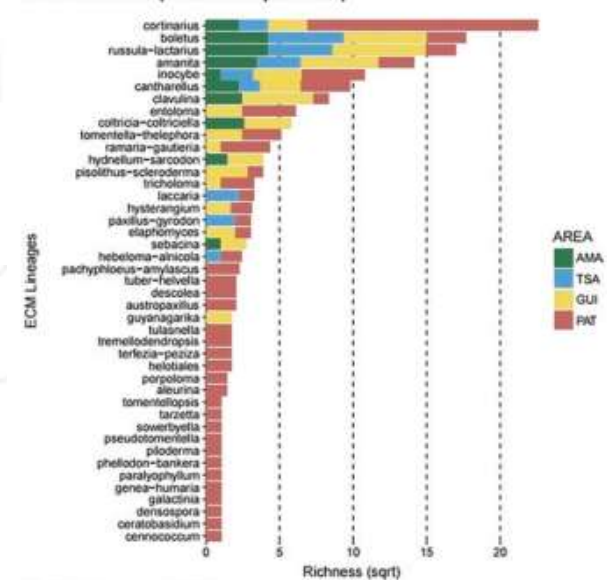
AMA: Amazon basin

TSA: tropical and subtropical Andes

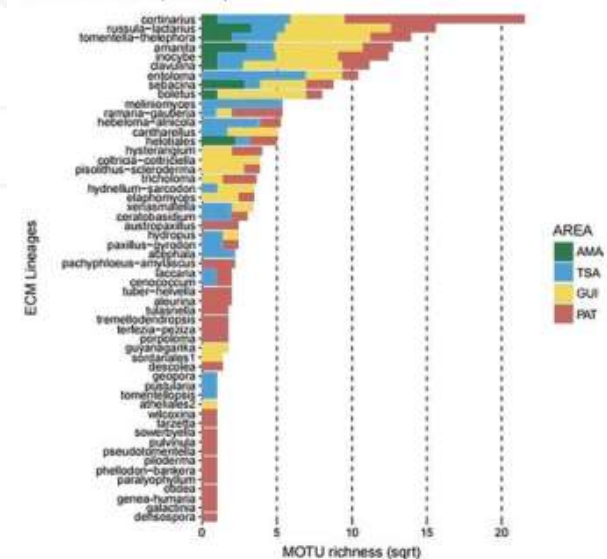
GUI: Guiana shield

PAT: Patagonian Nothofagaceae

a ECM richness (voucher specimens)



b ECM richness (MOTUS)



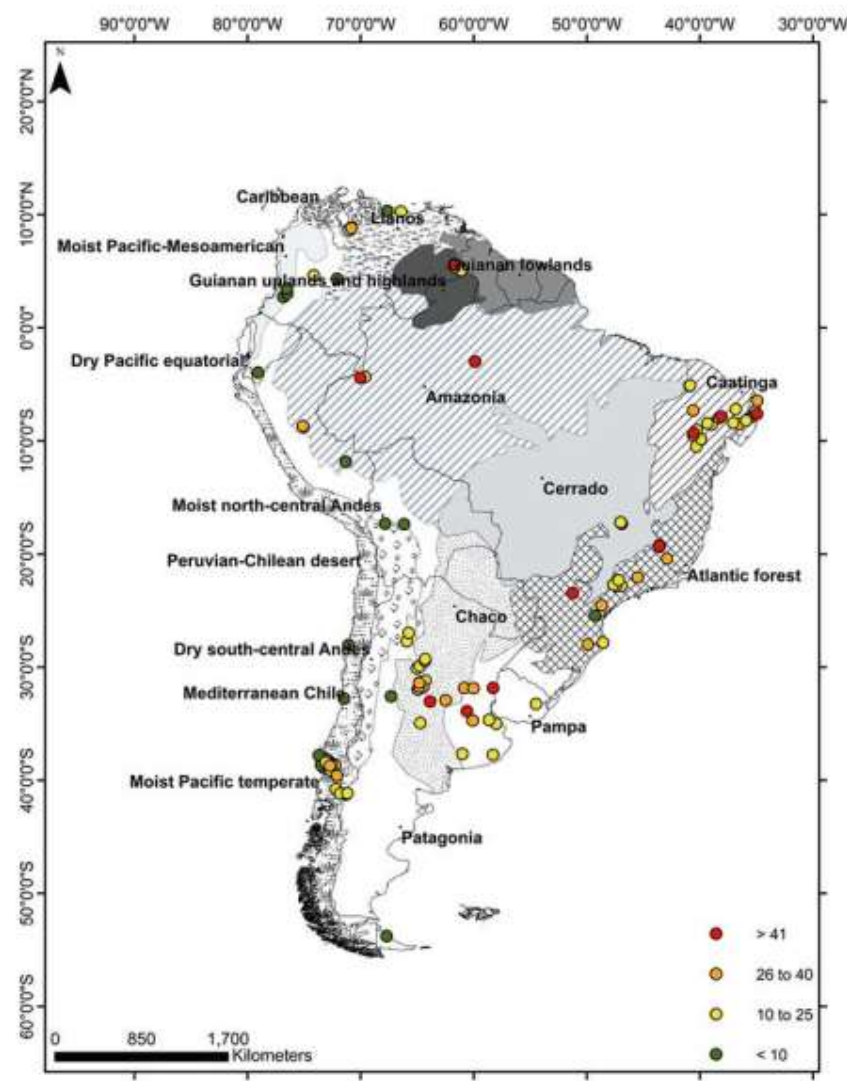
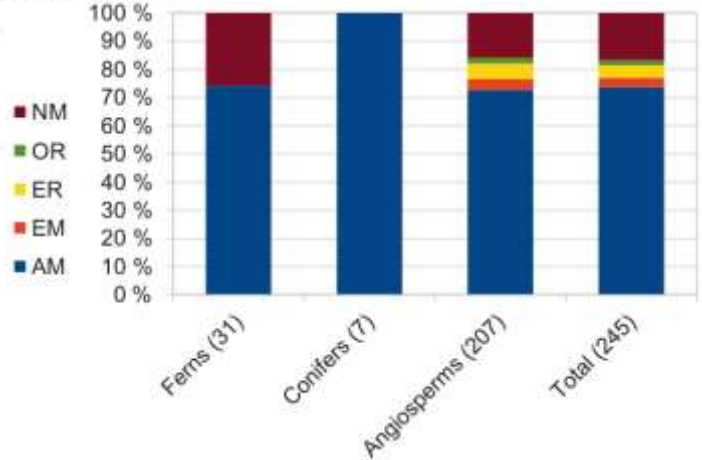
Chapter 3
Biodiversity of Arbuscular Mycorrhizal
Fungi in South America: A Review

M. Noelia Cofré, Florencia Soteras, M. del Rosario Iglesias,
Silvana Velázquez, Camila Abarca, Lucía Risio, Emanuel Ontivero,
Marta N. Cabello, Laura S. Domínguez, and Mónica A. Lugo

- 110 articles, 2187 records:
186 AMF morphospecies

Chapter 16
Mycorrhizal Studies in Temperate
Rainforests of Southern Chile

Roberto Godoy and César Marín

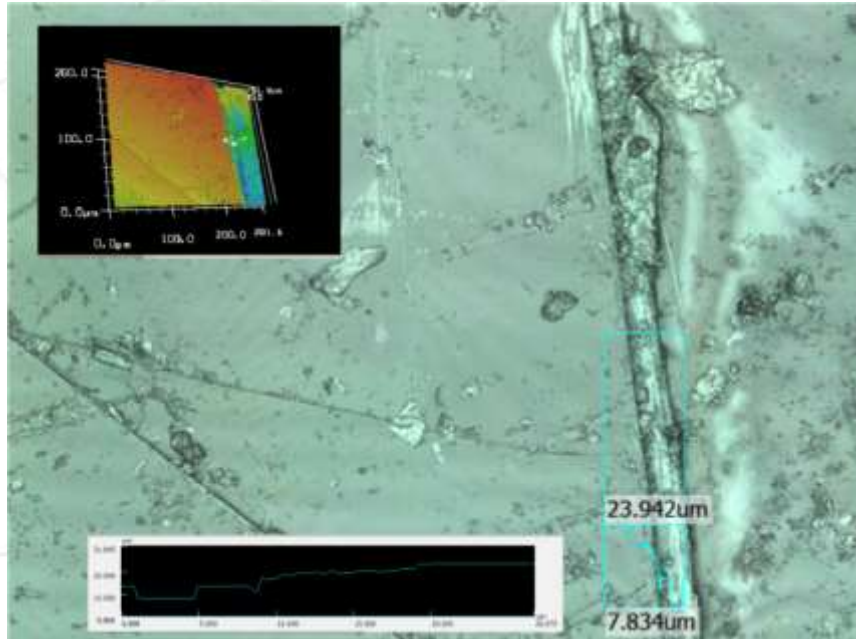


No. of AMF morphospecies by ecological division of South America



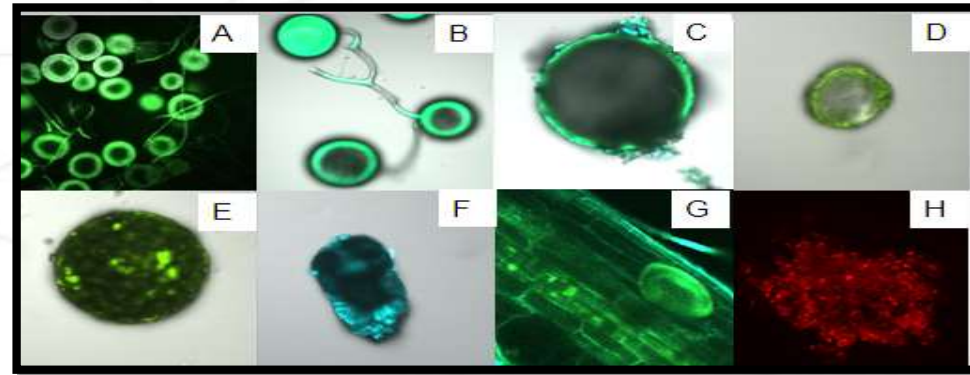
Some mycorrhizal ecosystem services...

Biogenic weathering of parent material by mycorrhizal fungi in southern Chile

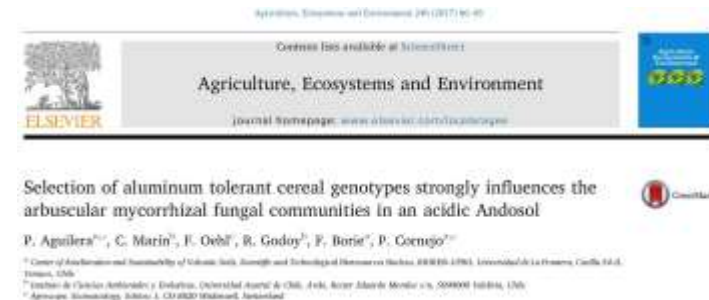


Channels formed by mycorrhizal fungi on Muscovite after one year in a *Fitzroya cupressoides* forest, Alerce Costero National Park, Chile. Photo with a Confocal Laser Microscope at 5000x. Godoy and Marín, 2019.

Arbuscular mycorrhizal fungi (glomalin) gives cereals tolerance to extremely high Al and low P conditions in volcanic soils of Chile



Glomalin formed around *Rhizoglyphus intraradices* spores in high Al soils.



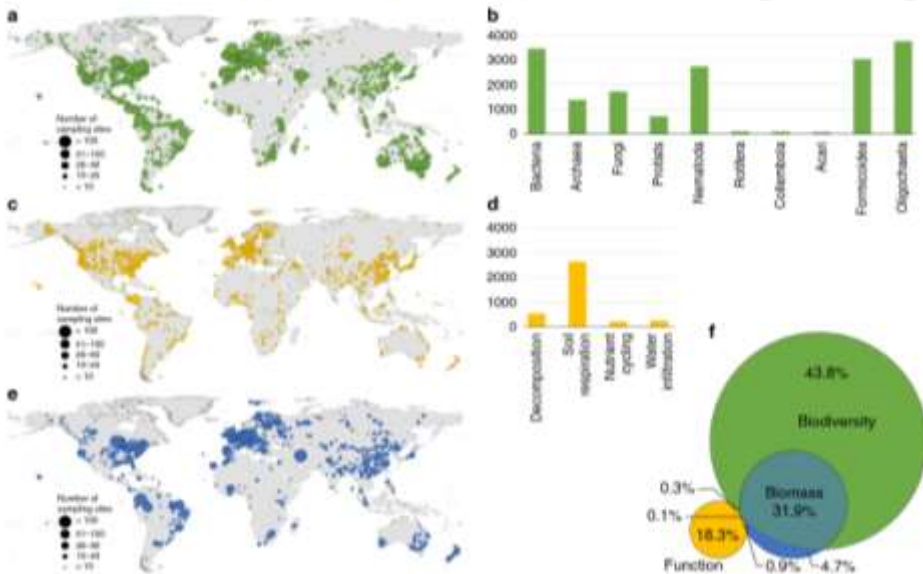
A final word: let's study both biodiversity AND ecosystem functions through time!



ARTICLE

Blind spots in global soil biodiversity and ecosystem function research

Carlos A. Guerra^{1,2,3}, Anna Heitz-Buchart^{1,5}, Johannes Šimončík⁴, Antonis Chatzinotas^{5,1}, Nathaly Guerrero-Ramírez^{1,5}, Simone Cesarz^{1,4}, Lila Beaumelle^{1,4}, Matthias C. Rillig^{7,8}, Fernando T. Maestre^{9,10}, Manuel Delgado-Baquerizo⁹, François Buscot^{5,1}, Jörg Overmann^{4,11}, Guillaume Patone^{1,5}, Helen R. P. Phillips^{1,5}, Marten Winter^{1,4}, Tesfaye Wubet^{12,1}, Kirsten Kusal^{1,13}, Richard D. Bardgett^{1,4}, Erin K. Cameron⁵, Don Cowan¹⁴, Tine Grebens¹⁵, César Marín^{16,19}, Alberto Orgiazzi²⁰, Brajesh K. Singh^{21,22}, Diana H. Wall²³ & Nico Eisenhauer^{1,4}

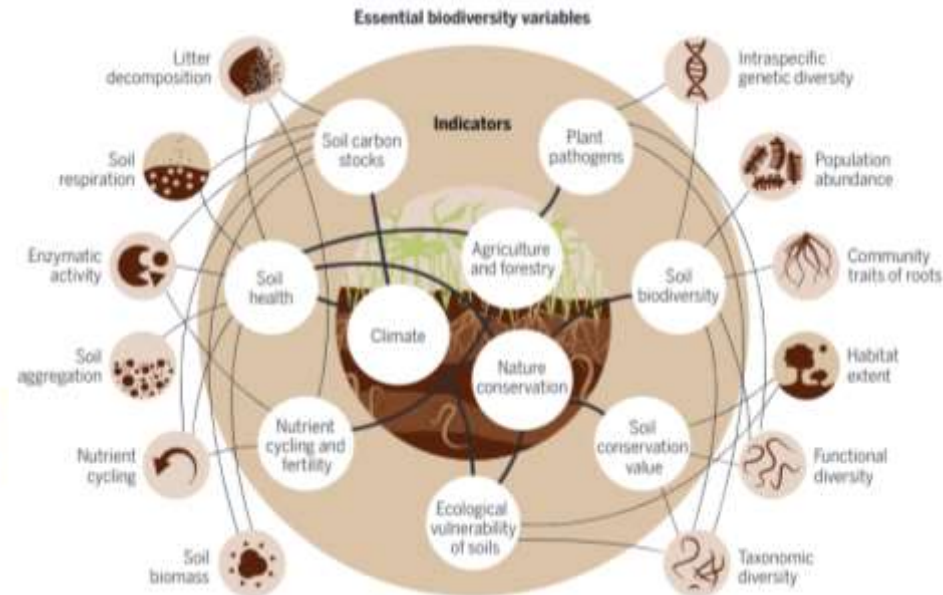


BIODIVERSITY

Tracking, targeting, and conserving soil biodiversity

A monitoring and indicator system can inform policy

By Carlos A. Guerra, Richard D. Bardgett, Lucrezia Caon, Thomas W. Crowther, Manuel Delgado-Baquerizo, Luca Montanarella, Laetitia M. Navarro, Alberto Orgiazzi, Brajesh K. Singh, Leho Tedersoo, Ronald Vargas-Rojas, Maria J. I. Briones, François Buscot, Erin K. Cameron, Simone Cesarz, Antonis Chatzinotas, Don A. Cowan, Ika Djukic, Johan van den Hoogen, Anika Lehmann, Fernando T. Maestre, César Marín, Thomas Reitz, Matthias C. Rillig, Linnea C. Smith, Franciska T. de Vries, Alexandra Weigelt, Diana H. Wall, Nico Eisenhauer



Many thanks to our symbiosis of mycorrhizologists!

Roberto Godoy, Maarja Öpik, Marc-André Selosse, Diana H. Wall, Marcela C. Pagano, Monica Lugo, Patricia Silva-Flores, Paula Aguilera, Sonia Fontenla, Micaela Boenel, Ayelén Inés Carron, Natalia Fernández, Maria Cecilia Maestre, Denise Moguilevsky, Nahuel Policelli, Clara Peña-Venegas, Aida Vasco, Alia Rodríguez, Jadson Moura, Camille Truong, Daniela Leon Velandia, Jéssica Duchicela, Diego Francisco Granja Ruales, Guillermo Bueno, Agustina Cottet, Ileana García, Fabiana Pezzani, Maria Isabel Mujica, María José Dibán Karmy, Sidney Luiz Stürmer, Lena Neuenkamp, Maret Gerz, Adriana Corrales, Andrés Argüelles Moyao, Luis Wall, Carlos Aguilar Trigueros, Matthew E. Smith, Kabir Peay, Marta Correia, Tine Grebenc, Marcelo Sulzbacher, Rebecca Bunn, Adriana Romero, Camille Delavaux, Camila Monroy Gúzman, Mary Luz Vanegas-León, Leho Tedersoo, Marcel van der Heijden, Daniel Acosta, Benoit Perez, Stephanie Porter, Jean Carlos Rodriguez-Ramos, Vasilis Kokkoris, Nadejda A. Soudzilovskaia, Francis M. Martin, Carlos A. Guerra.

JOIN the South American Mycorrhizal Research Network:

<https://southmycorrhizas.org/join/>

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III INTERNATIONAL SYMPOSIUM ON MYCORRHIZAL SYMBIOSIS IN SOUTH AMERICA
Leticia, Amazonas, Colombia — **2023**

Facing current challenges in biodiversity, conservation and sustainable food production

In the last fifty years, South America has shown to be one of the regions with the highest rates of transformation of its natural ecosystems. South America also shows decreasing rates of food production and greater dependency on food imports. In this scenario, what could mycorrhizas offer? What is the important role of mycorrhizas in preserving natural environments? Are mycorrhizas being used in soil or environmental restoration? How are mycorrhizas being used in South America to improve the quality and quantity of food production? What are the roles mycorrhizas can play in improving food security, restoring degraded forests and lands, and improve climate change resilience?

Come to the Amazon to discuss these issues with us and be the first in knowing the advances in mycorrhiza research in South America

We will be waiting for you!

Contact and information:
Clara P. Peña-Venegas
(cpena@sinchi.org.co)

