Helena Vallicrosa Pou

Postdoc | Terrer Lab, Civil and Environmental Engineering

Massachusetts Institute of Technology

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Terrestrial ecologist researcher interested in the carbon cycle; biogeochemical cycles between atmosphere, soil, and vegetation; plant elemental composition and stoichiometry; and its response to global change scenarios. My approaches are from local scale to global scale through both field experiments, computational science and AI models.

Education

PhD in Terrestrial Ecology (Cum Laude) - Universitat Autònoma de Barcelona, Spain.

Nov. 2021 – Sept. 2017. Dissertation: *Global change and forest nutrient stoichiometry. The foliar elemental composition of woody plants and its drivers. (http://hdl.handle.net/10803/674539)*

Master's degree in Terrestrial Ecology and Biodiversity Management - Universitat Autònoma de Barcelona, Spain

Sept. 2017 - September 2016. *Major in Terrestrial Ecology. Dissertation: Niche modeling of Catalan endemic species.*

Degree in Environmental Biology. Universitat Autònoma de Barcelona, Spain

June 2016 – Sept. 2012. *Major in plant biology*

Research experience

Center for Ecological Research and Forestry Applications (CREAF). Barcelona, Spain.

2017-2021. Predoctoral researcher. *Global Ecology Unit. Advisors: Josep Peñuelas and Jordi Sardans.*

National Institute of Agronomic Research (INRA), Kourou. French Guyanne.

2019. Imbalance-P project field campaign. *N and P fertilization experiment in tropical plots. Leaves and soil samples collection, processing, and analysis.*

Animal Biology, Vegetal Biology and Ecology Department (BABVE). Universitat Autònoma de Barcelona, Spain.

2017. Master's thesis. *Advisors: Miquel Ninyerola and Llorenç Sáez.*

Sao Paulo Botanical Garden, Sao Paulo, Brasil

2016. Internship. *Advisors: Eduardo Pereira Cabral and Laís Petri. Providing field and lab support.*

Universidade Presbiteriana Mackenzie's Herbarium. Sao Paulo, Brasil
2015. Internship. *Advisors: Ricardo Rosario. Identification, classification, and maintenance of new samples.*

Universidade Presbiteriana Mackenzie. Sao Paulo, Brasil
2016-2015. Degree's exchange. *Santander's Iberoamerican Grant.*

Teaching

Carbon cycle and Ecosystem ecology – Massachusetts Institute of Technology
Spring 2023 and spring 2022. Teaching assistant in a graduate course. *Lecture about the role of nutrients in the carbon cycle, R programming, and using R to solve ecological problems (AI models, GIS, statistics, data curation…)*

Scientific publications

Sardans, J., Llusià, J., Ogaya, R., **Vallicrosa, H.,** Filella, I., Gargallo-Garriga, A., Peguero, G., Van Langenhove, L., Verryckt, L.T., Stahl, C., Courtois, E.A., Bréchet, L.M., Tariq, A., Zeng, F., Alrefaei, A.F., Wang, W., Janssens, I.A. and Peñuelas, J. (2023), Foliar elementome and functional traits relationships identify tree species niche in French Guiana rainforests. Ecology. Accepted Author Manuscript e4118.

Vallicrosa, H., Lugli, F.L., Fuchslueger, L., Sardans, J., Ramirez-Rojas, I., Verbruggen, E., Grau, O., Bréchet, L., Peguero, G., Van Langenhove, L., Verrycky, L.T., Terrer, C., Llusià, J., Ogaya, R., Márquez, L., Fernández, P.R., Janssens, I., Peñuelas, J. Phosphorus scarcity contributes to nitrogen limitation in lowland tropical forests. **Ecology**. 104 (6): e4049.

Vallicrosa, H. (2022) Beyond nitrogen and phosphorus. **Nature Ecology and Evolution**, 6, 1056-1057.

Vallicrosa, H., Sardans, J., Maspons, J., & Peñuelas, J. (2022) Global distribution and drivers of forest biome foliar nitrogen to phosphorus ratios (N:P). **Global Ecology and Biogeography,** 31, 861– 871.

Verryckt, L. T., Vicca, S., Van Langenhove, L., Stahl, C., Asensio, D., Urbina, I., Ogaya, R., Llusià, J., Grau, O., Peguero, G., Gargallo-Garriga, A., Courtois, E. A., Margalef, O., Portillo-Estrada, M., Ciais, P., Obersteiner, M., Fuchslueger, L., Lugli, L. F., Fernandez-Garberí, P.-R., **Vallicrosa, H.**, Verlinden, M., Ranits, C., Vermeir, P., Coste, S., Verbruggen, E., Bréchet, L., Sardans, J., Chave, J., Peñuelas, J., and Janssens, I. A. (2022) Vertical profiles of leaf photosynthesis and leaf traits and soil nutrients in two tropical rainforests in French Guiana before and after a 3-year nitrogen and phosphorus addition experiment **Earth System Science Data**, 14, 5–18.

Vallicrosa, H., Sardans, J., Maspons, J., Zuccarini, P., Fernández-Martínez, M., Bauters, M et al. Global maps and factors driving forest foliar elemental composition: the importance of evolutionary history (2021). **New Phytologist**, 233 (1), 169-181 https://doi.org/10.1111/nph.17771

Van Langenhove, L., Depaepe, T., Verryckt, L. T., **Vallicrosa, H**., Fuchslueger, L., Lugli, L. F., et al. (2021). Impact of nutrient additions on free-living nitrogen fixation in litter and soil of two French-Guianese lowland tropical forests. ***Journal of Geophysical Research: Biogeosciences***, 126, e2020JG006023. https://doi.org/10.1029/2020JG006023

Vallicrosa, H.; Sardans, J.; Ogaya, R.; Fernández, P.R.; Peñuelas, J.(2021). Short-Term N-Fertilization Differently Affects the Leaf and Leaf Litter Chemistry of the Dominant Species in a Mediterranean Forest under Drought Conditions. **Forests** 2021, *12*, 605. https://doi.org/10.3390/f12050605

Sardans, J., **Vallicrosa, H**., Zuccarini, P. *et al.*(2021*)* Empirical support for the biogeochemical niche hypothesis in forest trees. **Nature Ecology and Evolution** 5, 184–194 (2021). https://doi.org/10.1038/s41559-020-01348-1.

Li, X., Sardans, J., Gargallo-Garriga, A., Asensio, D., **Vallicrosa, H.**, Peñuelas, J. (2020). Nitrogen reduction processes in paddy soils across climatic gradients: Key controlling factors and environmental implications, **Geoderma**, 368, 2020, 114275, https://doi.org/10.1016/j.geoderma.2020.114275.

Penuelas, J., Fernández-Martínez, M., **Vallicrosa, H**., Maspons, J., Zuccarini, P., Carnicer, J et al.(2020). Increasing atmospheric CO2 concentrations correlate with declining nutritional status of European forests. **Communications Biology** 3, 125 (2020). https://doi.org/10.1038/s42003-020-0839-y

Wang W, Sardans J, Wang C, et al. (2019) The response of stocks of C, N, and P to plant invasion in the coastal wetlands of China**. Global Change Biology**. 2019 Feb;25(2) 733-743. doi:10.1111/gcb.14491. PMID: 30346103.

CONGRESSES

AGU general assembly 2022

Vallicrosa, H., Terrer, C. How much N are plants taking yearly from the soil? AGU General Assembly 2022, oral presentation, 12-16 Dec.

EGU general assembly 2021

Ranits, C., Fuchslueger, L., Van Langenhove, L., Verryckt, L. T., Verlinden, M., **Vallicrosa, H.**, Ogaya, R., Llusià, J., Grau, O., Lugli, L. F., Janssens, I. A., Peñuelas, J., and Richter, A.: What controls microbial growth in tropical soils? The role of carbon and phosphorus., EGU General Assembly 2021, online, 19–30 Apr 2021, EGU21-10427, https://doi.org/10.5194/egusphere-egu21-10427, 2021.

EGU general assembly 2020

Vallicrosa, H., Sardans, J., Zuccarini, P., Maspons, J., and Peñuelas, J.: Neural Networks to estimate world forest foliar elemental composition and stoichiometry, EGU General Assembly 2020, Online, 4–8 May 2020, EGU2020-8994, https://doi.org/10.5194/egusphere-egu2020-8994, 2020

COURSES

Kaufman Teaching Certificate Program - MIT
50h. Spring 2023.

5th Training Course on New Advances in Land Carbon Cycle Modeling - Cornell
72h. Lead by Yiqi Luo and Lifen Jiang. Summer 2022.

Programming in R – Universitat Autònoma de Barcelona
10h. Dplyr, Rmarkdown, CREAF, July 2020

Gender perspective in research – Universitat Autònoma de Barcelona
4h. CREAF, November 2020.

Introduction to a meta-analysis in ecology - Universitat de Barcelona
4h. Workshop in the 1st meeting of the Iberial Ecological Society & XIV AEET Meeting. 2019

Other services

Reviewer
Nature plants, Nature Ecology and Evolution, Global Change Biology, Water Research, Plant and Soil, Forests

Scientific outreach
Schools: Talks, workshops, curricula design
General public: Radio collaboration, science and diversity activities.

Other skills and tools

- Programming language: Broad experience in R
- Languages:
  - Catalan: Native
  - Spanish: Native
  - English: Fluent
  - Portuguese: Fluent
- Fieldwork: design, sample collection, storage, processing, and analysis.