Curriculum Vitae

Antonio Montagnoli

Education

November 2003- January 2007

PhD, University of Insubria; Environmental science, environmental botany

October 1996 – July 2002

Master's Degree (5-year program) in Environmental Sciences

University of Molise, Faculty of Mathematics, Physics and Natural Sciences

Professional experience

November 2021 – Present

Associate Professor at the University of Insubria, Scientific Sector: BIOS-01/C (ex BIO/03) – Environmental and Applied Botany

November 2018 – November 2021

Assistant Professor at the University of Insubria (RTD-B, Tenure-track Researcher) Scientific Sector: BIOS-01/C (ex BIO/03) – Environmental and Applied Botany

October 2011 – October 2018

Research Technician at the University of Insubria (D1) in Environmental and Applied Botany

Department of Biotechnology and Life Science

May 2006 – September 2011

Research Technician at the University of Insubria (D1) in Environmental Sciences (Biological Area) Department of Chemical and Environmental Sciences

Project involvement (selected)

National

- PRIN 2022 (Programmi di Ricerca Scientifica di rilevante Interesse Nazionale) Title: Response of vascular cambium to water stress and heat in stem and root of woody plant model: regulatory mechanisms and homeostasis of initial cells
- PNRR (National Biodiversity Future Centre) Spoke 5 – Urban Biodiversity, Task 2.1 (Urban soil biodiversity: rhizosphere); Title: Study and monitoring through non-destructive methods of the dynamics of fine roots of tree species in urban environments and relation to biotic and abiotic factors.
- PNRR (National Biodiversity Future Centre) Spoke 5 – Urban Biodiversity, Task 6.1 (Urban Phyto-Bio-Remediation); Title: Phytoremediation of the Site of National Interest "Brescia-Caffaro": agreement with Comune di Brescia and Ente Regionale per i Servizi all'Agricoltura
- National Research Council – CNR Institute of Bioeconomy Firenze (IT) Long-term morpho-physiological effect of biochar on Vitis vinifera;
- PianosaLAB2 – Soil ecosystem hub. Research on the island of Pianosa, in collaboration with the Institute of Bioeconomy of the National Research Council (CNR). Functional traits of roots and leaves for the species Pistacia lentiscus in the different environments present on the island, in response to environmental and soil conditions.
- Coelux Srl Spin off University of Insubria (Lomazzo, Como IT) Research activity on Plant growth and development under Coelux® lighting system;

International

- European Forest Institute-EFI Progetto "Seeding vs. planting: a collaborative network of cliMAte-smart ResToration plots with OAKs - SMART-OAK" – Ref. n. G-03-2024-5
- Cost Action CA19128 Pan-European Network for Climate Adaptive Forest Restoration and Reforestation (PEN-CAFoRR) (ended November 2024)
- HORIZON-MSCA-2023-Staff Exchange; Title Eurasian Network for Collaborative Research on Tree-Root-Mycorrhizal-Pathogen Interactions in Forest Soils (EuAsiaN-ROOT)
- National University of Mongolia Department of Environment and Forest Engineering, School of Engineering and Applied Sciences Research Grant Visiting Fellowship P2019-3635 "Analysis of the root system performance of planted trees in an attempt to promote afforestation success in dry lands and desert of Mongolia – The green belt project Mongolia-Corea."
- USFS Rocky Mountain Research Station, 1221 S Main St, Moscow, Idaho, US US Forest Service – US Department of Agriculture Root architecture and tree stability of 32-year-old Pinus ponderosa trees
- Seventh Framework Program EU THEME [ENV.2012.6.3-&] Innovative resource-efficient technologies, processes and services. Zephyr (Zero-impact innovative technology in forest plant production).

Research interests

Brief research description

His work focuses on plant morpho-physiological responses to environmental and anthropogenic drivers, including soil erosion, drought, fire, and mechanical constraints.

He is interested in plant root development, including coarse- and fine-root traits as a function of plant stability, water and nutrient absorption strategies, and the genes, hormones, and proteins involved in root formation. He works at both the seedling and mature tree growth stages and at the single-plant and community levels.

More recently, his studies have focused on phytoremediation, invasive species management, plant biomass utilization for energy production, indoor plant cultivation, automatic plant phenotyping, laser scanning analysis for remote biomass estimation, and the impact of biochar on plant performance.

Root biology My work examines the biological mechanisms involved in the formation of new lateral roots from a secondary structure

Root dynamics and architecture I study the fine root dynamics in response to natural and anthropogenic factors and the coarse root architectural displacement to understand the plant response to mechanical constraints and improve their stability

Plant-environment interaction A more general approach is devoted to the comprehension of plant response to climate drivers and, in particular, to water and heat stress alone or in combination

Invasive Plants and Phytoremediation I am interested in limiting the spread of invasive alien plant species (IAPS) and valorizing their waste biomass for biochar production, which might have critical applications in phytostabilization and soil carbon storage

Teaching activities

2018 – Present

Plant Biology with Laboratory at the BSc Biological Science, University of Insubria

2019 – Present

Green Biomasses and Bioremediation at the MSc Biotechnology for Bio-Based and Health Industry, University of Insubria

2024 – Present

Sustainable use of plants and biomasses at the MSc Biology and Sustainability, University of Insubria

Oral presentations (last five years)

April 2025 – Lake Como School of Advanced Studies – The Bioeconomy Transformation: Science, Economics, Business, and Society – Title: Valorizing waste biomass a step toward the remediation approach. Bioeconomy School (3d edition) Science, Economics, Business and Society (invited).

September 2024 – The biochar option in viticulture. Title: Grapevine fine roots' plastic response to biochar application. 8th ICHAR Biochar School, ICHAR association, Florence, IT (invited)

September 2024 – The final conference of Cost Action 19128 - PEN-CAFoRR Pan-European Network for Climate Adaptive Forest Restoration and Reforestation. Title: Facing the Changes! Insights from tree roots' response to abiotic factors. Belgrade, Serbia. (invited)

June 2023 – Lake Como School of Advanced Studies – The Bioeconomy Transformation: Science, Economics, Business, and Society – Title: Turning waste biomasses into a resource: from invasive alien plant species to the black soldier fly: 2nd Bioeconomy Summer School, Como, IT (invited).

April 2023 – European Geosciences Union – Session BG3.3 Trait-based approach to assess plant species vulnerability and resilience to environmental changes in agriculture, forestry, and natural ecosystems. Title: Fine-root morphological traits may improve understanding of the vulnerability of Fagus sylvatica natural forests to late-fall unusual wildfire. Wien, Austria.

October 2021 - Forest Seedling Root Development and Function for Reforestation and Restoration – Title: Continual adaptation of the ponderosa pine root system to its environment. Virtual, Root Development Symposium, Western Forestry and Conservation Association, Purdue University, and USDA Forest Service with support from IUFRO divisions, Corvallis OR, USA (invited)

October 2019 – Title: Biochar and root system. 4th School of Biochar 2019, ICHAR association, Milan (invited).

July 2019 - Methodological approaches in root forestry research. Workshop on plant root research, National University of Mongolia, Ulaanbaatar, Mongolia (invited).

Selection of Publication and Key Bibliometrics

My record comprises 79 peer-reviewed journal publications, an h-index of 23, cand 1,552 Citations (Scopus – April 2026), reflecting a diversity of specialties (botany, plant physiology, ecology, forestry, soils, phytoremediation, and bioenergy). I provide the most recent publications that exemplify my career.

Leverkus A et al. Drivers of seedling emergence and early growth of 12 European oak species: Results from a cross-continental experiment. Forest Ecology and Management 2026

Sferra G, Montagnoli A, Bucci A, Monaco P, Agosto G, Trupiano D, Naclerio G, Chiatante D, Scippa GS. An integrated perspective on the interactions between Quercus cerris fine roots and microbial community in top- and sub-layers of urban rhizosphere. Plant biosystems 2025

Wang Y, Liesche J, Crivellaro A, Dolezal J, Altman J, Chiatante D, Dimitrova A, Fan Z, Fu P, Forest F, Gricar J, Heuret P, Isnard S, Maurin O, Montagnoli A, Rathgeber CBK, Tsedensodnom E, Trueba S, Salmon Y. Physical constraints and environmental factors shape phloem anatomical traits in woody angiosperm species. New Phytologist 2025

Terzaghi M, Chiatante D, Kompatscher K, Sobotik M, De Servi C, Hertl B, Montagnoli A. Key role of specific above- and below-ground morphological traits of ornamental plant species on preventing freeze–thaw soil erosion on steep slopes. Plant and Soil 2025

Ceriani A, Chafik Y, Miali A, Bourgerie S, Dalle Fratte M, Cerabolini B, Morabito D, Montagnoli A. Remediating heavy metal-contaminated soil through invasive alien plant-derived biochar and stinging nettle powder. Chemosphere. 2025 380

Ceriani A, Dalle Fratte M, Agosto G, Beatrice P, Reguzzoni M, Bettucci L, Casini D, Cerabolini BEL, Montagnoli A. Woody and herbaceous invasive alien plant species-derived biochars are potentially optimal for soil amendment, soil remediation, and carbon storage. Global Change Biology Bioenergy. 2024;16:e13117

Montagnoli A, Hudak AT, Raumonen P, Lasserre B, Terzaghi M, Silva CA, Bright BJ, Vierling LA, de Vasconcellos BN, Chiatante D, Dumroese RK. Terrestrial laser scanning and low magnetic

field digitization yield similar architectural coarse root traits for 32-year-old Pinus ponderosa trees. Plant Methods 2024 20:102

Beatrice P, Dalle Fratte M, Baronti S, Miali A, Montagnoli A. The long-term effect of biochar application to Vitis vinifera L. reduces fibrous and pioneer root production and increases their turnover rate in the upper soil layers. Front. Plant Sci. 2024 15:1384065.

Beatrice P, Saviano G, Reguzzoni M, Divino F, Fantasma F, Chiatante D, Montagnoli A. Light spectra of biophilic LED-sourced system modify essential oils composition and plant morphology of Mentha piperita L. and Ocimum basilicum L. 2023 Front. Plant Sci. 14:1093883.

Dalle Fratte M, Montagnoli A, Anelli S, Armiraglio S, Beatrice P, Ceriani A, Miali A, Nastasio P, Cerabolini BEL. Mulching in lowland hay meadows drives an adaptive convergence of above- and below-ground traits reducing plasticity and improving biomass: A possible tool for enhancing phytoremediation. Front. Plant Sci. 2022 13:1062911.

Montagnoli A, Lasserre B, Terzaghi M, Byambadorj S-O, Nyam-Osor B, Scippa GS and Chiatante D (2022) Fertilization reduces root architecture plasticity in Ulmus pumila used for afforesting Mongolian semi-arid steppe. Front. Plant Sci. 2022 13:878299.

Beatrice P, Chiatante D, Scippa GS, Montagnoli A. Photoreceptors' gene expression of Arabidopsis thaliana grown with biophilic LED-sourced lighting systems. PLoS ONE 2022 17(6): e0269868.

Montagnoli A, Baronti S, Alberto D, Chiatante D, Scippa GS, Terzaghi M. Pioneer and fibrous root seasonal dynamics of Vitis vinifera L. are affected by biochar application to a low fertility soil: A rhizobox approach. Sci Total Environ. 2021 10;751:141455.

Chiatante D, Montagnoli A, Trupiano D, Sferra G, Bryant J, Rost TL, Scippa GS Meristematic Connectome: A Cellular Coordinator of Plant Responses to Environmental Signals? Cells 2021, 10, 254

Baesso B, Terzaghi M, Chiatante D, Scippa GS, Montagnoli A. WOX genes expression during the formation of new lateral roots from secondary structures in Populus nigra (L.) taproot. Nat. Sci. Rep. 2020, 10, 18890.

De Zio E, Montagnoli A, Karady M, Terzaghi M, Sferra G, Antoniadi I, Scippa GS, Ljung K, Chiatante D, Trupiano D. Reaction Wood Anatomical Traits and Hormonal Profiles in Poplar Bent Stem and Root. 2020 Front. Plant Sci. 11:590985.

De Zio E, Trupiano D, Karady M, Antoniadi I, Montagnoli A, Terzaghi M, Chiatante D, Ljung K, Scippa GS. Tissue-specific hormone profiles from woody poplar roots under bending stress. Physiol. Plant. 2019 165, 101–113.

Dumroese RK, Terzaghi M, Chiatante D, Scippa GS, Lasserre B, Montagnoli A. Functional Traits of Pinus ponderosa Coarse Roots in Response to Slope Conditions. Front. Plant Sci. 2019 10:947.

Montagnoli A, Dumroese RK, Terzaghi M, Onelli E, Scippa GS, Chiatante D. Seasonality of fine root dynamics and activity of root and shoot vascular cambium in a Quercus ilex L. forest (Italy). For. Ecol. Manag. 2019 431, 26–34

Montagnoli A, Terzaghi M, Chiatante D, Scippa GS, Lasserre B, Dumroese RK. Ongoing modifications to root system architecture of Pinus ponderosa growing on a sloped site revealed by tree-ring analysis. Dendrochronologia 2019 58:125650.

Baesso B, Chiatante D, Terzaghi M, Zenga D, Nieminen K, Mahonen AP, Siligato R, Helariutta Y, Scippa GS, Montagnoli A. Transcription factors PRE3 and WOX11 are involved in the formation of new lateral roots from secondary growth taproot in A. thaliana. Plant Biol 2018 20(3):426-432.