

PERSONAL INFORMATION

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CAREER PROFILE

I am a plant physiologist and forest ecologist with broad research interests unified by the goal of better understanding how forest functioning varies in relation to major environmental and anthropogenic changes. During my post-doctoral research experiences I have significantly contributed to improving our understanding on forest carbon, nitrogen and water cycling by using stable isotopes alone or in combinations with other methodological approaches (e.g., metagenomic, leaf gas exchanges, eddy covariance), as demonstrated by papers I published and international collaborations I built. My publications represent milestones in my career, which on one hand demonstrate my capacity to work with top scientists experts in my field and to disseminate results in international journals. On the other hand they are the 'fuel' for new and exciting ideas and collaborations to develop. My approach to research is enthusiastic, determined and inquisitive, always seeking to gain an in-depth knowledge of topics, to ask new and exciting questions and to find the best and novel approaches to answer them.

PROFESSIONAL EXPERIENCE

Numbers at the end of each project refer to the papers published in peer-reviewed international journals (and in preparation) as listed in the Appendix I

Centre de Recerca Ecològica i Aplicacions Forestals, CREAM (Spain)

October 2018-present

Post-doctoral researcher, working at the following project:

DRESS (Water use and drought resistance strategies at different scales: from homeostatic mechanisms to regional vegetation dynamics, funded by the Agencia Estatal de Investigación (AEI) and the European Regional Development Fund (FEDER). PIs: Maurizio Mencuccini, Jordi Martínez Vilalta

Centre de Recerca Ecològica i Aplicacions Forestals, CREAM (Spain)

June 2016-June 2018

Marie Skłodowska-Curie Fellow, working at the following project:

A novel approach to determine canopy nitrification in the phyllosphere of European forests: combining multiple isotope tracers and proteogenomic techniques (NITRIPHYLL). Mentors: Prof. M Mencuccini and Prof. J Peñuelas; collaborators: A Avila and S Mattana (CREAF, Barcelona, Spain), J Cáliz and E Casamayor (Centre of Advanced Studies of Blanes, CEAB-CSIC, Spain), S Hellsten (IVL Swedish Environmental Research Institute, Gutenberg, Sweden), E Vanguelova (Forest Research, Farnham, UK), A Verstraeten (Research Institute for Nature and Forest, Brussels, Belgium), M Nicolas (Office National des Forêts, France), D Elustondo and JM Santamaria Ulecia (Universidad de Navarra, Spain) P Waldner (WSL, CH), Giorgio Matteucci (ISAFOM, CNR, Italy), F Magnani and G Marcolini (University of Bologna, Italy), P Merilä (Natural Resources Institute, Finland) K Watanabe (National Institute for Environmental Studies, Japan) and Greg Michalski (Purdue University, USA). The project included 12 forests across EU within the Level II plots of the ICP forests network. [24,25]

Earth Systems Research Center, University of New Hampshire (USA)

March 2013-May 2016

Post-Doctoral Research Associate, working at the following NASA funded project:

Exploring relationships among water use efficiency, canopy nitrogen and carbon cycling across North American ecosystems to improve land surface models. Mentors: Prof S Olliger, Prof. H Asbjornsen and Dr. J Xiao, Earth Systems Research Center, University of New Hampshire (USA); collaborators: K Jennings and L Lepine (UNH) and Dr. S Belmecheri (Laboratory of tree ring research, The University of Arizona, USA). The project included 8-12 forests across the US within the AmeriFlux network. [12,15,17,19,20,22]

School of Geosciences, University of Edinburgh (UK)

October 2011-May 2012

Research Fellow, working at the following projects:

1) *Understanding the interactions between nitrogen deposition and climate on tree growth, water-use efficiency and N cycling for UK forests*. Mentor: Prof. M Mencuccini (CREAF, University of Edinburgh); collaborators: Dr. J Morison, Dr. M Perks, Dr. R Pitman, Dr. E Vanguelova (Forest Research of Forestry Commission, UK). The project included 12 forest stands across the UK, most of them included in the ICP forests monitoring network. [23]

2) *Leaf gas exchange across multiple forest sites in Andean and lowland Peru*. Joint Amazon Carnegie RAINFOR Expedition (JACARE), coordinated by Prof. P Meir (University of Edinburgh, UK, now at the Australian National University, ANU), Prof. Y Malhi (University of Oxford, UK), Prof. G Asner (Stanford, USA), Prof. N Salinas (UNSAAC, Cusco, Peru), Prof. J Lloyd (University of Leeds, UK) Prof. O Atkin (ANU, Canberra, Australia). Leading- together with Dr. Y Ishida (now at the James Cook University, Australia) and Dr. L Weerasinghe (now at the University of Peradeniya, Sri Lanka)-- intensive fieldwork along an altitudinal transect in the tropical forests of Peru (from the lowland Puruvian side of the Amazon forest to the Andean altitudinal transect). [10,13,14,16,21]

School of Geosciences, University of Edinburgh (UK)

September 2009-September 2011

Newton International Fellow, working at the following projects:

1) *The role of nitrogen deposition in driving carbon uptake by forest ecosystems* project within the Newton International Fellowship. Mentor: Prof. Mencuccini. Collaborators: Dr. Sheppard, Dr. Sutton (Center for Ecology and Hydrology, Edinburgh), Dr. Perks (Forest Research of Forestry Commission, UK). The project included a unique experimental site in Scotland where long-term nitrogen manipulation experiment was carried out over tree canopies to simulate the increase in nitrogen deposition. [6]

3) *Leaf gas exchange across multiple forest sites in Andean and lowland Peru* (see above).

3) *The role of stable isotopes in tracing N transformations in forest ecosystems*, within the NERC isotope geoscience award: PI Prof. M Mencuccini, co-Investigator R Guerrieri; collaborators: Dr. Tim Heaton (NERC-NIGL, UK), Dr. Vanguelova (Forest Research, UK) and Dr. Michalski (Purdue University, USA). [11]

University of Basilicata (Italy)

April 2008-April 2009

Research assistant, contributing to the following projects [7,8,9]:

1) *CarboItaly* (PI Prof. R Valentini, co-PI Prof. M Borghetti);

2) *Remote sensing of photosynthetic potential in forest ecosystems: comparison among species and effects of water stress* (MIUR-COFIN project, PI: Prof. M Borghetti, co-PI Prof. F Ripullone)

University of Basilicata (Italy)

January 2004- February 2007

PhD, contributing to the following projects:

1) *Isotope signal in tree rings as tool to monitor forest "health"* project within the ESF-SIBAE grant awarded to R. Guerrieri. Mentors: Dr. R Siegwolf, Dr. M Saurer. [4,5,27,28]

2) *Mediterranean Terrestrial Ecosystem and Increasing Drought (MIND)*. Funded by V EU-Framework Programme; PI F Miglietta, co-PI Prof. M Borghetti. [2,3]

3) PRIN 2005: "Limitazioni ambientali e fisiologiche dell'accrescimento degli alberi al limite superiore del bosco nelle Alpi e negli Appennini". PIs: Prof. R Motta (University of Torino) and Prof. A Saracino (University of Basilicata, now University Federico II in Napoli). [26,27]

University of Basilicata (Italy)

June-October 2003

Post-degree research contract contributing to the following projects:

1) *Mediterranean Terrestrial Ecosystem and Increasing Drought (MIND)*. See above [2,3]

2) *Drought and Mediterranean forests: stomatal mechanisms in the regulation of plant gas exchanges*. [1]

EDUCATION

Master in Landscape and Garden design, University of Turin (Torino, Italy)

October 2007

PhD, University of Basilicata (Potenza, Italy)

February 2007

Thesis: Tree ecophysiology under limiting conditions. Two study cases: at treeline and at exposure to emissions from anthropogenic activities

COMPETITIVE PERSONAL GRANTS AND AWARDS

EU Horizon 2020: Marie Skłodowska-Curie Individual Fellowship	2016-2018
The Royal Society, the British Academy and the Royal Academy of Engineering: Newton International Fellowship	2009-2011
European Science Foundation (ESF) within the Nitrogen in Europe program: Visiting researcher (3 months) at the University of Edinburgh (UK)	2008
ESF within the Stable Isotopes in Biospheric-Atmospheric Exchange program: visiting PhD student (7 months) at the Paul Scherrer Institute (CH).	2005-2006

RESPONSABILITIES

Presentation at scientific conferences

Symposium: From the deep past to the Anthropocene. Coupling earth system function to climate change (2018), INRA, Bordeaux, France, **poster presentation**; **Imbalance P conference (2018)**, Lommel, Belgium, **oral presentation**; **AGU Fall Meeting (2017)**, New Orleans, USA, **oral presentation**; **I International Workshop on Isotopes for Tropical Ecosystem Studies (2017)**, University of Costa Rica, San José, Costa Rica, **invited key note talk**; **6th ICP forests scientific conference (2017)**, Bucharest, Romania, **invited key note talk**; **3rd Ameridendro (2016)**, Mendoza, Argentina, **2 posters** and **1 oral presentation**; **X Conference of the Italian Society of Silviculture and Forest Ecology -SISEF- (2015)**, Florence, Italy, **1 oral presentation and 1 poster**; **AGU (2014)**, San Francisco, USA, **1 poster** as first author, **1 poster and 1 oral presentation** as co-author; **ESA (2014)**, Sacramento, USA, **oral presentation**; **NitroEurope (2011)**, Edinburgh, UK, **oral presentation**; **EGU (2010)**, Vienna, Austria, **oral presentation**; **Stable Isotopes in Biospheric-Atmospheric Exchange (2010)**, Ascona, Switzerland, **poster**; **VII SISEF Conference (2009)**, Isernia-Pesche **oral presentation**; **Joint European Stable Isotopes Meeting (2008)**, Presqu' Île de Giens, France, **poster**; **IUFRO Conference (2007): Natural Hazards and Natural Disturbances in Mountain Forests**, Trento, Italy, **oral presentation**; **VI SISEF Conference (2007)**, Arezzo, Italy, **poster**; **BASIN SIBAE International Conference (2006)**, Tomar, Portugal, **poster**; **V SISEF Conference (2005)**, Grugliasco, Italy, **2 posters**; **IV SISEF Conference (2004)**, Potenza, **poster**.

Public outreach

Science communication at the **Edinburgh International Science Festival (2011-2012)**; *Open day of the Ecohydrology lab* at the Earth Systems Research Center Institute, **University of New Hampshire (2016)**; Exhibition '*Després de la fi del món – after the end of the world*' at the **Centre de Cultura Contemporània de Barcelona**, co-organizing the event '*Boscós en moviment. Com afectarà el canvi climàtic els nostres boscos?*' led by Prof. Jordi Martínez Villalta (CREAF/UAB) (**March 2018**).

Interview for the *i*) Italian **blog 'Oggiscienza'** (<https://oggiscienza.it/2016/05/02/foreste-cambiamenti-climatici-fotosintesi/>); *ii*) **CREAF blog** (<http://blog.crea.cat/es/conocimiento/invertimos-mucho-mas-tiempo-en-las-publicaciones-cientificas-que-en-hacer-la-ciencia-accesible/>); *iii*) **Universidad de Costa Rica blog** <http://www.ucr.ac.cr/noticias/2017/10/19/costa-rica-busca-liderazgo-en-uso-de-isotopos-para-estudio-de-ecosistemas-tropicales-y-del-clima.html>;

Core team of the **March for Science Barcelona (April 2017)**;

Invited to contribute to the **2017 ICP forests Executive Report** for public and policy makers.

Preparing an **article** for the issue 46 of the **European journal for science teachers, Science in School**, which will be published in October 2018.

Supervision of undergraduate and master students (University of New Hampshire, Durham, USA and at the CREA, Barcelona, Spain); Lecturing and laboratory/field demonstrating experience for a number of environmental and forestry science courses, i.e., Plant Ecophysiology, Professional skills in the Ecological and Environmental Sciences at the School of GeoSciences, University of Edinburgh (UK); Silviculture, Forest ecophysiology at the University of Basilicata (IT); Stable Isotopes and Plant physiology at the Paul Scherrer Institute (CH), Laboratory of Atmospheric Chemistry - Ecosystem Fluxes / Stable Isotope Research Group.

Reviewer for **1) scientific papers** submitted to high impact scientific journals (Tree Physiology, Oecologia, New Phytologist, iForest, Frontiers in Plant Science, Biogeosciences, Global Change Biology, Ecological Indicators, Rapid Communications in Mass Spectrometry, Plant Cell and Environment, Dendrochronologia, Scientific Reports (Nature), Agricultural and Forest Meteorology; **2) grant proposals** submitted to the Swiss National Foundation, **SNF** (CH), the National Science Foundation, **NSF** (USA); **Free University of Bolzano** (Italy). Serving as subject editor for the journal iForest-Biogeosciences and Forestry (5-years impact factor: 1.573).

Member of the **American Geophysical Union** (AGU) since 2014 and the **Italian Society of Silviculture and Forest Ecology** (SISEF) since 2004.

Appendix I - LIST OF PUBLICATIONS

PUBLICATIONS IN INTERNATIONAL PEER-REVIEWED JOURNALS

- [24] **Guerrieri R**, Lecha L, Mattana S, Caliz J, Casamayor E, A Barceló, Michalski G, Peñuelas J, Avila A, Mencuccini M (2018). Contribution of atmospheric deposition and canopy microbial nitrification to throughfall nitrate fluxes in a Mediterranean holm oak forest. Due to be submitted to **Global Change Biology** (end of October 2018).
- [23] **Guerrieri R**, Vanguelova E, Pitman R, Benham S, Perks M, Morison J, Mencuccini M (2018). *Exploring trends in water-use efficiency and nitrogen availability across British forest stands by a triple isotope approach in tree rings*. Submitted to **Nature, Scientific Reports** (under review).
- [22] **Guerrieri R**, Belmecheri S, Ollinger S, Asbjornsen H, Jennings K, Xiao J, Stocker BD, Martin M, Hollinger D, Bracho-Garrillo R, Clark K, Dore S, Kolb T, Munger JW, Novick K, Richardson AD (2018). *Disentangling the role of photosynthesis and stomatal conductance on rising forest water-use efficiency*. Submitted as Letter to **Nature Geoscience** (under review).
- [21] Smith N, Keenan T, Prentice C, Wang H, Wright I, Niinemets U, Crous K, Domingues T, **Guerrieri R**, Ishida Y, Kattge J, Kruger E, Maire V, Rogers A, Serbin S, Tarvainen L, Togashi H, Townsend P, Wang M, Weerasinghe L, Zhou S (2018). *Global photosynthetic capacity is optimized to the environment*. Submitted to **Ecology Letters** (under review).
- [20] Asbjornsen H, Campbell J, Jennings K, Vadeboncoeur M, McIntire C, Templer PH, Phillips R, Bauerle TL, Dietze M, Frey S, Groffman P, **Guerrieri R**, Hanson PJ, Kelsey E, Knapp A, McDowell NG, Meir P, Novick K, Ollinger S, Pockman W, Schaberg P, Wullschlegel SD, Smith MD, Rustad L (2018). *Guidelines and considerations for designing precipitation manipulation experiments in forest ecosystems*. **Methods in Ecology and Evolution** (accepted).
- [19] Craine J, Elmore AJ, Aranibar J, Bauters M, Boeckx P, Crowley BE, Dawes MA, Delzon S, Fajardo A, Fang Y, Fujiyoshi L, Gray A, **Guerrieri R**, Gundale MJ, Hawke D, Hietz P, Jonard M, Kearsley E, Kenzo T, Makarov M, Marañón-Jiménez S, McGlynn TP, McNeil BE, Mosher SG, Nelson DM, Peri PL, Roggy JC, Sanders-DeMott R, Song M, Szpak P, Templer PH, Van der Colff D, Wang L, Werner C, Xu X, Yang Y, Yu G, ZmudczyńskaSkarbek K (2018). *Isotopic evidence for oligotrophication of terrestrial ecosystems*. **Nature Ecology and Evolution** (accepted).
- [18] Peñuelas J, Saradans J, Filella.. [other 28 names], **Guerrieri R** et al. (2017). Quantifying Impacts of Drought and Wildfire on Forest's Water and Carbon Resources. **Forest Ecology and Biology** 8 (12), 463.
- [17] **Guerrieri R**, Jennings K, Belmecheri S, Asbjornsen H, Ollinger S (2017). *Evaluating climate signal recorded in tree ring $\delta^{13}C$ and $\delta^{18}O$ from bulk wood and α -cellulose for six species across the northeastern US*. **Rapid Communications in Mass Spectrometry** 31 (24), 2081-2091.
- [16] Fyllas N, Bentley LP, Shenkin A, Asner GP, Atkin OK, Díaz S, Enquist B, Farfan-Rios W, Gloor E, **Guerrieri R**, Huaraca Huasco W, Ishida Y, Martin RE, Meir P, Phillips O, Salinas N, Silman M, Weerasinghe LK, Zaragoza-Castells J, Malhi Y (2017). *Solar radiation and functional traits explain the decline of forest primary productivity along a tropical elevation gradient*. **Ecology Letters** 20 (6), 730-740.
- [15] **Guerrieri R**, Lepine L, Asbjornsen H, Xiao J, Ollinger S (2016). *Evapotranspiration and water use efficiency in relation to climate and canopy nitrogen in U.S. forests*. **Journal of Geophysical Research: Biogeosciences** 121, 2610–2629.
- [14] Malhi Y, Girardin CAJ, Goldsmith GR, Doughty CE, Salinas N, Metcalfe D B, Huaraca Huasco W, Silva-Espejo JE, del Aguilla-Pasquell J, Farfán Amézquita F, Aragão LEOC, **Guerrieri R**, Ishida FY, Bahar NHA, Farfan-Rios W, Phillips OL, Meir P, Silman M (2016). *The variation of productivity and its allocation along a tropical elevation gradient: a whole carbon budget perspective*. **New Phytologist** 214 (3), 1019-1032.
- [13] Bahar NHA, Ishida FY, Weerasinghe LK, **Guerrieri R**, O'Sullivan OS, Bloomfield KJ, Asner GP, Martin RE, Lloyd J, Malhi Y, Philips OL, Meir P, Salinas N, Cosio EG, Domingues T, Long BM, Evans JR and Atkin OK (2016). *Photosynthetic capacity is greater in high-elevation, Andean tropical moist forests than their lowland, Amazonian counterparts*. **New Phytologist** 214 (3), 1002-1018.
- [12] Jennings K, **Guerrieri R**, Vadeboncoeur M, Asbjornsen H (2015). *Response of *Quercus velutina* growth and water use efficiency to climate variability and nitrogen fertilization in a temperate deciduous forest in the northeastern U.S.* **Tree Physiology** 36 (4), 428-443.
- [11] **Guerrieri R**, Vanguelova EI, Michalski G, Heaton THE, Mencuccini M (2015). *Isotopic evidence for the occurrence of biological nitrification and nitrogen deposition processing in forest canopies*. **Global Change Biology** 21 (12): 4613-4626.

- [10] Atkin O, Bloomfield KJ, Reich PB, Tjoelker MG, [...], **Guerrieri R**, et al. (2015). *Global variability in leaf respiration in relation to climate, plant functional types and leaf traits*. **New Phytologist** 206 (2), 614-636.
- [9] Bellino A, Alfani A, Selosse MA, **Guerrieri R**, Borghetti M, Baldantoni D (2014). *Nutritional regulation in mixotrophic plants: new insights from *Limodorum abortivum**. **Oecologia** 175 (3), 875-885.
- [8] Leonardi S, Gentilesca T, **Guerrieri R**, Ripullone F, Magnani F, Mencuccini M, van Noije T, Borghetti M (2012). *Assessing the effects of nitrogen deposition and climate on carbon isotope discrimination and intrinsic water-use efficiency of angiosperm and conifer trees under rising CO₂ conditions*. **Global Change Biology** 18, 2925-2944.
- [7] Ripullone F, Rivelli A, Baraldi R, Guarini R, **Guerrieri MR**, Magnani F, Peñuelas J, Raddi S, Borghetti M (2011). *Effectiveness of the photochemical reflectance index to track photosynthetic activity over a range of forest tree species and plant water status*. **Functional Plant Biology** 38, 177-186.
- [6] **Guerrieri R**, Mencuccini M, Sheppard LJ, Saurer M, Perks M, Levy P, Sutton MA, Borghetti M, Grace J (2011). *The legacy of enhanced N and S deposition as revealed by the combined analysis of $\delta^{13}\text{C}$, $\delta^{18}\text{O}$ and $\delta^{15}\text{N}$ in tree rings*. **Global Change Biology** 17, 1946-1962.
- [5] **Guerrieri R**, Siegwolf RTW, Saurer M, Ripullone F, Mencuccini M, Borghetti M (2010). *Anthropogenic NO_x emissions alter the intrinsic water-use efficiency (WUEi) for *Quercus cerris* stands under Mediterranean climate conditions*. **Environmental Pollution** 158, 2841-2847.
- [4] **Guerrieri MR**, Siegwolf RTW, Saurer M, Jäggi M, Cherubini P, Ripullone F, M Borghetti (2009). *Impact of different nitrogen emission sources on tree physiology as assessed by a triple stable isotope approach*. **Atmospheric Environment** 43, 410-419.
- [3] Ripullone F, **Guerrieri MR**, Saurer M, Siegwolf RTW, Jäggi M, Guarini R, Magnani F (2009). *Testing a dual isotope model to track carbon and water gas exchanges in a Mediterranean forest*. **iForest** 2, 59-66.
- [2] Ripullone F, Borghetti M, Raddi S, Baraldi R, Vicinelli E, Cantoni L, Nolè A, **Guerrieri MR**, Lapolla A, Anichini M, Saurer M, Siegwolf R, Jäggi M, Magnani F (2009). *Physiological and structural changes of an evergreen Mediterranean forest in response to long-term altered precipitation regimes*. **Trees-Structure and Function** 23 (4), 823-834.
- [1] Ripullone F, **Guerrieri MR**, Magnani F, Nolè A, Borghetti M (2007). *Stomatal conductance and leaf water potential responses to hydraulic resistance variation in *Pinus pinaster* plants*. **Trees- Structure and Function** 23, 137-144.

TECHNICAL REPORT

- [25] **Guerrieri R**, Peñuelas J, Mencuccini M (2018). *Nitrification in tree canopies*. ICP Forests 2017. Executive Report. Eberswalde, Germany, pp: 5-6. [<https://icp-forests.org/pdf/ER2017.pdf>] ISSN 1020-587X, e-ISSN 2198-6541]

PhD thesis

- [26] **Guerrieri R** (2007). *Tree ecophysiology under limiting conditions. Two study cases: at treeline and at exposure to emissions from anthropogenic activities*.

OTHER PUBLICATIONS IN PEER-REVIEWED ITALIAN JOURNAL

- [27] **Guerrieri MR**, Todaro L, Carraro V, D'Alessandro CM, De Stefano S, Lapolla A, Saracino A (2008). *Ecophysiological performances of *Pinus leucodermis* at the tree line in Mediterranean area*. **Forest@** 5, 28-38.
- [28] **Guerrieri MR**, Saurer M, Siegwolf RTW, Waldner P, Cherubini P (2006). *Impact of traffic on $\delta^{15}\text{N}$, $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ of needles and annual tree rings of Norway spruce (*Picea abies* L.)*. **Forest@** 3 (3), 437-445
- [29] D'Alessandro CM, **Guerrieri MR**, Saracino A (2004). *Comparing carbon isotope composition of bulk wood and holocellulose from *Quercus cerris*, *Fraxinus ornus* and *Pinus radiata* tree rings*. **Forest@** 1 (1), 51-57.

Appendix II – ACQUIRED SKILLS

Interpersonal

- Teamwork;
- *Networking* mindset;
- Team builder and collaborative with integrity and respect;
- Creative thinking;
- Open to discussion and share experiences/knowledge;
- Positive and emphatic attitude;
- Determinate and pro-active;
- Critical and independent thinking.

Organizational

- Independence and responsibility in managing a research projects, dealing with different tasks, e.g., writing up proposal and applying for funding, preparing working plan, planning experiment/fieldwork/labwork, planning and organizing meetings with people involved in the project, analyzing data, preparing reports and deliverables);
- Ability to cope with stress and work under-pressure (e.g. during intensive fieldwork or when dealing with different tasks and project deadlines);
- Problem solving and decision-making.

Technical

Fieldwork-gained skills

- Leaf gas-exchanges with LI-COR 60400;
- Leaf water potential by *Scholander pressure chamber*;
- Sampling of different tree (e.g., wood cores, stem micro-cores) and forest (e.g., soil, water) samples
- Tree growth measurements (DBH);
- Set up of sap flow sensor (Granier method)

Lab work-gained skills

- Dendrochronological measurements;
- Sample preparation and stable isotope analyses in leaf, wood and soil samples ($\delta^{13}\text{C}$, $\delta^{18}\text{O}$ and $\delta^{15}\text{N}$)
- Cation and Anion resin preparation for *extracting* NH_4 and NO_3 in water samples for measuring stable isotopes ($\delta^{15}\text{N}$, $\delta^{17}\text{O}$ and $\delta^{18}\text{O}$);
- Microbial DNA extraction from foliar, soil and water samples;
- Sample preparation and xylogensis analyses.

Information Technology and Data analyses

- Organizing and managing dataset R and Linux (basic);
- Statistical analyses with R (experiences with different statistical test, with parametric and non-parametric test for analyses of variance, multiple comparisons; linear regression and mixed effects model);
- Plotting results with R studio;
- Basic of bioinformatics tools for processing raw DNA sequences: e.g., QUIIME.

Communication

- Presentations of research at scientific international conferences; *seminars in academic and non-academic Institutions*;
- Publication of scientific papers in high-quality peer-reviewed journals and other journals of relevance in Italy;
- Preparation and submission of final reports/deliverables within grant and funding awarded;
- Demonstrating to Undergraduate/graduate students on Stable Isotopes and Plant physiology;
- Supervising undergraduate and master students and informal mentoring offered to PhD/master students;
- Science communication and outreach activities for general public and policy-makers.

Languages

- Italian (native speaker);
- English: comprehension (proficient) spoken (proficient) and written (proficient);
- Spanish: comprehension (good) spoken (basic) and written (basic).