CURRICULUM VITAE

[EMILY ROSE PALM]

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1. Scientific Profile

Dr. Palm graduated with a bachelor's degree in Botany from the University of Washington (USA) in December 2004 after having complete the required credits, 96 of which in the field of animal and plant biology, plant physiology, ecology, chemistry, morphology, anatomy, and classification. After a one-year internship with Prof. Elizabeth Van Volkenburgh in the Dept. of Biology at UW, studying light-mediated leaf expansion in Arabidopsis light-receptor mutants, Dr. Palm began her graduate studies at the UW in September 2006. Her Ph.D studies focused on the physiological adaptations of plants to ultramafic soils (serpentine), in particular their extremely low ratios of calcium to magnesium and high concentrations of heavy metals. During her doctorate studies, Dr. Palm acquired extensive theoretical and applied knowledge of the measurements and interpretation of physiological parameters connected to photosynthesis and carbon fixation and metabolism (gas exchange, fluorescence, etc.), plant growth parameters, and mechanisms of nutrient uptake and assimilation. Also in this period, Dr. Palm significant experience with teaching through her role as a teaching assistant for many diverse courses in the biology department and forestry (2880 hours in total), and as the lead instructor for Advanced Plant Physiology in 2013 and 2014 (300 hours total). Moreover, she participated extensively in the UW Department of Biology Greenhouse docent program, leading school groups of all ages on tours of the world-renowned teaching collection and the medicinal herb garden.

Dr. Palm was the recipient of the Department of Biology Plant Biology Fellowship in September 2006 and of the prestigious NSF fellowship in 2008 (National Science Foundation Graduate Research Fellowship), both of which allowed her to further her graduate studies and develop a significant level of autonomy in terms of the development and management of a research project. In 2011 she received financial support (Student Technology Fee fund - $60.150) to purchase an instrument for physiological measurements of plants, insects and soil on behalf of the Department of Biology at the UW. She obtained her Ph.D in December 2013 with the title: "*Exclusion, amelioration, tolerance: an investigation of the physiological basis for tolerance in serpentine Mimulus guttatus*".

Following her doctorate, Dr. Palm continued her research activities abroad, receiving a research fellow position at the University of Florence in Italy, which was renewed for 5 consecutive years. In this period, she had the opportunity to collaborate on various national and international research projects, focusing her attention on the eco-physiological responses of plant to abiotic stress (salt and heavy metals) and on the physiological processes connected to the use of plants to purify contaminated soils (phytoremediation).

Recently, she has been interested in the use of salt tolerant edible plant species (halophytes) for food (*Cakile maritima*, *Salsola soda* e *Tetragonia tetragonoides*) in semiarid environments as a way of reducing the water footprint of our current food production system and to improve food security in response to climate change. She has published several studies describing adaptation mechanisms and physiological responses of plant to salt stress and heavy metals in peer-reviewed journals (Experimental and

Environmental Biology, Journal of Environmental Management, Plant Science). She has expanded her knowledge of electrophysiological techniques used in plant physiology (electrical signals, ion flux rates) and factors influencing photosynthesis, the assimilation and metabolism of CO_2.

In October 2022, Dr. Palm received a research fellowship from the Department of Biotechnology and Bioscience of the University of Milan-Bicocca in the lab group of Prof. Massimo Labra, participating in research activities under PNRR project MUSA: Multilayered Urban Sustainability Action. She has since obtained a position of Ricercatore a tempo determinato A for the same project. She is responsible for the management of research activities related to the physiological responses of plants used in urban de-paving and re-greening projects, and evaluating the ecosystems services that plants may provide in an urban context (reduction of heat islands, improvement of air quality and water use efficiency).

Regarding teaching activities, Dr. Palm has taught for various universities and study abroad programs, including Elements of Botany and General Physiology for the University of Teramo (in Italian) and courses in Food Science and Sustainable Agriculture for Umbra Institute, an American study abroad program in Perugia (in English). She is currently the instructor of 'Plant Physiology' in the Department of Biotechnology and Biosciences at the University of Milan-Bicocca. She has given numerous lectures for several universities, the most recent for the Stanford study abroad program in Florence. Her collaborations with international research groups (United States, Canada, Czech Republic, Poland, France, Germany, Spain, Israel and Tanzania) all center on investigating the physiological mechanisms in the involved in the plant responses to stress.

2. Educational Background

2.1 Academic background

-2006 - 2013: **Doctorate in Biology** (Ph.D); University of Washington di Seattle, (USA) with the thesis title "*Exclusion, amelioration, tolerance: an investigation of the physiological basis for tolerance in serpentine* Mimulus guttatus". Degree awarded 13 December 2013; Grade: 3.71/4.0.

-2001 - 2004: **Bachelor of Science in Botany** (B.Sc); University of Washington di Seattle, Washington (USA). Degree awarded 17 December 2004; Grade: 3.33/4.0

2.2 Complementary education

16 Apr 2018	ECOSEARCH s.r.l. – Training session on the use of the new model of Licor (LI-6800) the gas exchange and fluorescence measurements in plants. Duration 6 hours
Dec 2009-Apr 2010	VISITING RESEARCHER (4 months) – DAGRI – Università degli Studi di Firenze. Tutors: Prof. Stefano Mancuso e Dott.ssa Camila Pandolfi ACTIVITIES CONDUCTED: - Study of transport mechanisms of calcium and magnesium at the root level in *Mimulus guttatus* L. -Training in plant electrophysiology techniques (membrane potential, non-invasive ion flux rates)

-Assistance in the fluorescence measurements in *Olea europaea* L. under salt stress

June 2007 – Jan 2013 — VISITING RESEARCHER (1 month total divided between 4 visits) – Department of Biology – University of Victoria – Victoria, BC (Canada)
Tutors: Prof Barbara Hawkins e Dr. Samantha Robbins
ACTIVITIES CONDUCTED:
- Study of transport mechanisms of calcium and magnesium at the root level in *Mimulus guttatus* L.
- Training in plant electrophysiology techniques (membrane potential, non-invasive ion flux rates)

3. PROFESSIONAL EXPERIENCE

3.1 RESEARCH ACTIVITY

Apr 2023 - Present — Department of Biotechnology and Biosciences – University of Milan-Bicocca
ROLE: Researcher a tempo determinato (A); responsible for research and development of green spaces in an urban context and on the University of Milan-Bicocca campus.
TITLE: *MUSA: Multilayed Urban Sustainablility Action*
DESCRIPTION OF ACTIVITIES: Research
The research, a part of a broader collaboration between several universities and companies in Milan (PNRR-*MUSA – Multilayer Urban Sustainability Action*) seeks to elaborate instruments capable of evaluating the effect of urban vegetation on air quality, water-use efficiency, and biodiversity in an urban context (project title MUSA: Multilayed Urban Sustainability Action). The activities planned have two directions: 1) providing data to support the design of green spaces on the University of Milan-Bicocca campus and 2) investigations of the microbial diversity on the diverse types of urban vegetation in relation to their capacity to intercept air pollution particles and consequent improvements to air quality. These activities will be conducted through eco-physiological methods (gas exchange, fluorescence, growth analyses), morpho-functional traits (leaf shapes, stomatal parameters, superficial structures) and biochemical (pigments, ions, compatible osmolytes).

Oct 2022 – Mar 2023 — Department of Biotechnology and Biosciences – University of Milan-Bicocca
ROLE: Research fellow; responsible for research and development of green spaces in an urban context and on the University of Milan-Bicocca campus.
TITLE: *MUSA: Multilayed Urban Sustainablility Action*
DESCRIPTION OF ACTIVITIES: Research
The research, a part of a broader collaboration between several universities and companies in Milan, seeks to elaborate instruments

capable of evaluating the effect of urban vegetation on air quality, water-use efficiency, and biodiversity in an urban context (project title MUSA: Multilayed Urban Sustainability Action). The activities planned have two directions: 1) providing data to support the design of green spaces on the University of Milan-Bicocca campus and 2) investigations of the microbial diversity on the diverse types of urban vegetation in relation to their capacity to intercept air pollution particles and consequent improvements to air quality. These activities will be conducted through eco-physiological methods (gas exchange, fluorescence, growth analyses), morpho-functional traits (leaf shapes, stomatal parameters, superficial structures) and biochemical (pigments, ions, compatible osmolytes).

Oct 2021 – Sept 2022 Department of Agriculture, Food, Environment, and Forestry Science and Technology (DAGRI) – University of Florence

ROLE: Research fellow (12 months) responsible for physiological investigations (ion flux rates, gas exchange, biometric parameters), data elaboration and publication, advising thesis and doctoral students and international Erasmus participants.

TITLE: '*Physiological effects of stress in arboreal plants in urban areas*'

DESCRIPTION OF ACTIVITIES Research, education, scientific communication

Research regarding the physiological responses of plants used in phytoremediation in urban zones. Laboratory-based experiments used electrophysiological approaches to evaluate the effect of various pollutants (heavy metals) on the electrical signals in plants. The goal is correlate the accumulation of metals during phytoremediation with changes in electrical signals of the roots.

Ott 2020 – Sett 2021 Department of Agriculture, Food, Environment, and Forestry Science and Technology (DAGRI) – University of Florence

ROLE: Research fellow (12 months) responsible for physiological investigations (ion flux rates, gas exchange, biometric parameters), data elaboration and publication, advising thesis and doctoral students and international Erasmus participants.

TITLE: *'The effects of anesthesia on plants: a physiological and electrophysiological study'*

DESCRIPTION OF ACTIVITIES: Research, education, scientific communication. The research of this fellowship position involved studying the eco-physiological (growth rate, production of biomass, photosynthetic parameters) and electrophysiological (electrical signals, ion flux rates) responses in plants, as a model system in which to study the effects of anesthesia. Other methods used consisted of measurements of growth direction (roots), cellular organization, transduction of electrical signals and morphological features through confocal microscopy. This work was in collaboration with researchers at the University of Bonn (Germany).

Gen 2015 – Sett 2020 Department of Agriculture, Food, Environment, and Forestry Science and Technology (DAGRI) – University of Florence

ROLE: Postdoctoral research fellow (60 months): Member of the research group and responsible for the carrying out of experimental trials and related eco-physiological studies; elaboration, publication and discussion of results; advising of thesis students, both local and international
TITLE: '*Trees as indicators of environmental pollutio*n'
DESCRIPTION OF ACTIVITIES The research conducted during this period consisted of two major activities – laboratory-based experiments and field studies. Both concentrated on the theme of trees as indicators of environmental pollution. On the basis of information gleaned from observations and measurements in the field, laboratory experiments were conducted using electrophysiological approaches to evaluate the effect of heavy metals on the electrical signaling in plants. The goal was to correlate the accumulation of heavy metals in plants during phytoremediation with variations in electrical signaling in roots. Field activities consisted of physiological analyses of plant in situ in the context of phytoremediation, including measurements of gas exchange and fluorescence, evaluating growth and collecting tissue and soil samples for further analyses in the laboratory.

Jan 2014 – Sept 2014 Department of Biology – University of Washington (Seattle, USA)
Role: Postdoctoral research fellow (9 months); Lead instructor of Advanced Plant Physiology and responsible for physiological analyses for an international collaborative project on the effect of drought stress on various bean cultivars
DESCRIPTION OF ACTIVITIES:
This fellowship consisted of both teaching and research components. The latter was a study on the physiological responses of bean plants to drought through analyses of the following parameters: photosynthetic activity of the leaves, growth measurements, and estimates of productivity. Markers of stress were identified as the effects of different levels of water stress on gas exchange, chlorophyll fluorescence, water relations (water potential, osmolarity and turgor), leaf pigments, membrane integrity, growth rates and the production of biomass. The project was part of an international collaboration between the University of Washington (USA), CIAT (Colombia), University of Sydney (Australia) and Forshungszentrum Juelich (Germany).

Jan 2007 – Mar 2007 Department of Biology – University of Washington (Seattle, USA)
ROLE: Doctoral research fellowship (3 months)
TITLE: '*Investigating the role of the plant hormone, brassinosteroid, on the cell fate of root epidermal cells in* Arabidopsis thaliana L.'.
DESCRIPTION OF ACTIVITIES: Training on the principal techniques of molecular biology: extraction of nucleic acids, (DNA -RNA) PCR e RT PCR, and conducting of a mutant screening in *Arabidopsis thaliana* in relation to plant hormones.

Sept 2005 – Sept 2006 Department of Biology – University of Washington (Seattle, USA)
ROLE: Intern (12 months)

TITLE: '*Investigation of the role of photoreceptors on leaf expansion in* Arabidopsis thaliana *L.*'
DESCRIPTION OF ACTIVITIES: This project with *Arabidopsis thaliana* L.*,* (WT and mutants) focused on analyzing leaf expansion in response to the wavelength of light and the genes involved in the development process.

3.2 TEACHING AND SEMINAR ACTIVITIES

3.2.1. TEACHING ACTIVITIES

AA 2024/2025

TEACHING CONTRACT: Instructor, presso Stanford University Bing Study Abroad in Florence
"*Beyond Tomatoes – The Botany of Traditional Tuscan Life*"

DESCRIPTION OF ACTIVITIES: 30 hours of lecture and laboratory-based activities. Equivalent to 4 CFU.

AA 2023-2024/2024-2025

TEACHING CONTRACT: University of Milan-Bicocca
"*Plant Physiology*"; (SC 05/A1 SSD BIO/03)
DESCRIPTION OF ACTIVITIES: The course is part of the Laurea Magistrale in Biology and consists of teaching assignment of 14 hours of lecture during the 2023/2024 academic year. The course included the topics of water relations and absorption in plants, stomatal regulation, sugar transport, and the absorption and assimilation of inorganic nutrients. (in Italian).

04-18/11/2022

TEACHING ASSISTANT: University of Milan-Bicocca
"*Plant Physiology*"; (SC 05/A1 SSD BIO/03)
DESCRIPTION OF ACTIVITIES: The course is part of the Laurea Magistrale in Biology and consists of teaching assignment of 14 hours of lecture during the 2022/2023 academic year. The course included the topics of water relations and absorption in plants, stomatal regulation, sugar transport, and the absorption and assimilation of inorganic nutrients. (in Italian).

01/10/2021 – 30/09/2022

TEACHING CONTRACT: University of Teramo
"*Elements of Botany and General Physiology*"; (SC 05/A1 SSD BIO/03)
DESCRIPTION OF ACTIVITIES: The course is part of the Laurea Magistrale in "*Sustainable intensification of horticultural production*" and was a teaching assignment of 24 hours of lecture (3 CFU), during the 2021/2022 academic year. The course included the following topics: classification of organisms – prokaryotes and eukaryotes; plant cell structure; plant tissues; anatomy, morphology and function of roots, stems and leaves; growth and development; carbon assimilation and metabolism (Calvin-Benson cycle, C_3, C_4 e CAM photosynthesis, glycolysis and the Krebs cycle); absorption and

transport of water and nutrients; ecological adaptation of abiotic stress (salinity, drought, and heavy metals) (in Italian).

07/02/2022 - 28/04/2022 TEACHING CONTRACT: Umbra Institute, Perugia.

'Sustainable Food Production in Italy: Local Traditions and Global Transformations' .
DESCRIPTION OF ACTIVITIES: The teaching assignment was a part of the Bachelors' level program "*Food, Sustainability and Environment*" and consisted of 30 hours of lecture (5 credits). The following topics were covered: agricultural systems (regenerative, modern, biodynamic, organic and agroforestry); climate change and food production; agroecology and agroforestry; agriculture and physical and mental health; methods of evaluating sustainability; urban agriculture (in English). (in inglese).

'*The Science of Italian Food*'

DESCRIPTION OF ACTIVITIES: The teaching assignment was a part of the Bachelors' level program "*Food, Sustainability and Environment*" and consisted of 30 hours of lecture (5 credits). The following topics were covered in the scope of Italian culture and cooking: fermentation (lievito madre, alcohol); production of cheese; food preservation of food; coffee (marketing, evaluation); foraging culture (in English).

Jan 2014 – Mar 2014 TEACHING CONTRACT: University of Washington

April 2013 – June 2013 Department of Biology; Advanced Plant Physiology

DESCRIPTION OF ACTIVITIES: 300 hours total (2 quarters; lecture – 60 hours, laboratory - 240 hours; 5 credits); assignment consisted of teaching a combined theoretical/practical course in Advanced Plant Physiology in the Biology Department for 40 students in 2014 and 100 students in 2013. The course was designated for students in the Bachelor of Science and Masters and Doctorate in Biology. Dr. Palm was responsible for the following tasks: preparation and execution of three lectures per week (3 hours); execution of laboratory exercise two times per week for 2 separate sections of students (12 hours); tutoring of a doctoral student as a teaching assistant (6 hours); preparation, administration, and grading of exams for each student. The course included the following topics: plant cell structure; plant tissues; anatomy, morphology and function of roots, stems and leaves; growth and development; carbon assimilation and metabolism (Calvin-Benson cycle, C_3, C_4 e CAM photosynthesis, glycolysis and the Krebs cycle); absorption and transport of water and nutrients; ecological adaptation of abiotic stress (salinity, drought, and heavy metals) (in English).

Jan 2007 – Aug 2012 TEACHING CONTRACT: University of Washington

Department of Biology; diverse courses: plant physiology, animal physiology, plant ecophysiology, general botany, experimental research.

DESCRIPTION OF ACTIVITIES: Responsible for teaching two laboratory sections a week (20 hours a week; 12 quarters). The position also consisted of the preparation of laboratory materials, preparation and the evaluation of weekly assignments and exams, and assisting students with the course material through office hours. 2880 hours total (12 quarters, 144 weeks in total; 20 hours per week) (in English)

3.2.2. INTERNATIONAL TEACHING ACTIVITY

10/01-14/01/2022 TEACHING; VISITING PROFESSOR; Universitat Politècnica de València Escuela Técnica Superior de Ingeniería Agronómica y del Medio Natural (Spagna)

DESCRIPTION OF ACTIVITIES

Erasmus+ Staff Mobility for Teaching and Training, University of Teramo. Selected to participate in the Erasmus Mobility for Teaching Program, Dr. Palm gave two lectures to Master's level students with the titles '*The serpentine syndrome – Plant adaptations to this unique soil system'* and '*Heavy metal stress and the physiology behind phytoremediation'* and participated in field trip with the students as a part of their coursework (12 hours) (in English).

30/01/2017 – 03/02/2017 INVITED RESEARCHER Plant Science Research Institute; University of Montreal; Prof. Michel Labrecque

4101 Sherbrooke St. E, Montreal QC H1X2B2 Canada

DESCRIPTION OF ACTIVITIES

Development and instruction of an intensive course on the use of the Licor 6400 system for measuring gas exchange and chlorophyll fluorescence in plants to 20 students, researchers and postdoctoral researchers (6 hours), a theoretical course on photosynthesis and fluorescence in plants (2 hours) and a course on the preparation and maintenance of the instrument and its various components (16 hours) (in English).

3.2.3. NATIONAL AND INTERNATIONAL SEMINARS

14/08/2023 INVITED RESEARCHER
21/07/2022 Ayatana Artists' Research Program
07/06/2021 3676 Kettles Road, Ottawa ON K0A2Z0 Canada
09/07/2020 DESCRIPTION OF ACTIVITIES:

INVITATED SEMINAR – Germinate: Plant School for Artists;

Seminars on the theme of plant responses to environmental stress and plant-pollinator interactions. Duration of each seminar: 2 hours (8 hours total). Online; in English.

23/10/2022
12/05/2022
07/03/2022

INVITED RESEARCHER

Stanford University - Bing Overseas Studies Program
Via de'Bardi, 36 50125 Firenze (FI)
DESCRIPTION OF ACTIVITIES: Seminar '*Pushing our boundaries: Novel research in plant behavior'.* Three seminars on the theme of plant behaviors in response to environmental stimuli. 1 hour, in-person seminars (in English).

19-20/10/2021

Department of Agriculture, Food, Environment, and Forestry Science and Technology (DAGRI) – University of Florence
DESCRIPTION OF ACTIVITIES: Seminar (3 hours) entitled "*Phytotechnologies: Ecological, plant-based for global problems"* for the Bachelor's degree major "Eco-compatibility of tree cultivation". (In Italian)

16/06/2021

SEMINAR – Master 's course "Plant future: Innovative Social Projects with Plants"; Scientific coordinator: Prof. Leonardo Chiesi
DESCRIPTION OF ACTIVITIES: Guided tour of the Botanical Garden of the University of Florence to 40 Master's level students. 2 hours (In Italian).

03/02/2017

INVITED RESEARCHER: IRBV Departmental Seminar – University of Montreal - Montreal, Canada

DESCRIPTION OF ACTIVITIES: Seminar (1.5 hours) entitled "*Evaluating root level responses to zinc, copper and nickel with ion flux measurements"* as a part of the weekly departmental seminar series*;* invited by Professor of Botany and Director of Montreal Botanical Garden, Prof. Michel Labrecque. (in English). The seminar was given to bachelors, masters, and doctoral students as well as postdoctoral researchers and professors of the department.

4. PARTICIPATION IN NATIONAL AND INTERNATIONAL RESEARCH COLLABORATIONS

Nov 2022 – present

SCIENTIFIC COLLABORATOR: Dr. Angela Mkindi
ROLE: Member of the research group, responsible for

experimental activities related to eco-physiology and the development of a research proposal

INSTITUTION: The Nelson Mandela African Institution of Science and Technology; Arusha, Tanzania

Email: angela.mkindi@nm-aist.ac.tz

SCIENTIFIC COLLABORATION *Developing* Tephrosia vogelii *cultivation as a non-chemical pest management solution*

DESCRIPTION OF ACTIVITIES An investigation of the climate and physiological factors that regulate the production of chemical compounds with pesticide properties (rotenoids) in the plant *Tephrosia vogelii* L. in the African countries of Tanzania, Malawi and Kenya. A part of the collaboration included the preparation of a proposal to participate in the call "African Agriculture Climate Adaptation Research System Request for Proposals" of the Science for Africa Foundation.

Mar 2022 – present

SCIENTIFIC COLLABORATOR: Prof. François Bouteau

ROLE: Responsible for electrophysiological measurements (ionic fluxes rates and electrical signals) and the advising of a student participating in the Erasmus program

ISTITUTION: Université Paris Diderot/Laboratoire Interdisciplinaire des Energies de Demain; Paris, France;

Email: fcabouteau@gmail.com

SCIENTIFIC COLLABORATION *'The effects of anesthesia on plants: a physiological and electrophysiological study'*

DESCRIPTION OF ACTIVITIES: A study of the physiological and electrophysiological responses (electrical signals, ion fluxes) in rice, as a model plant for the study of the effect of anesthetics on plants. The goal of the project was to assess the potential for anesthetics to alter the response to stimuli in plants in the same manner that they do in animal system (in the sense that they reduce electrical signals for a period of time). To that end, electrical signals were measured using a microelectrode array and rate of ion fluxes in rice exposed to salt stress in the absence and presence of anesthetics to determine the effect of the stress.

May 2020 – **present**

SCIENTIFIC COLLABORATOR: Prof. Anna Podlasek

ROLE: Member for the research team; development of the experimental protocols and the physiological investigation in the realm of phytoremediation of landfill leachate; responsible for data analysis and preparation of scientific publication

ISTITUTION: Department of Revitalization and Architecture, Institute of Civil Engineering – Warsaw University of Life Sciences in Poland

Email: anna_podlasek@sggw.edu.pl

SCIENTIFIC COLLABORATION: '*Evaluating the physiological response of naturally occurring plants for the phytoremediation of landfill plants'*. The work focused on the identification of plant species with the capacity to be used in phytoremediation for the treatment of urban runoff and landfill leachate

April 2020 - present

SCIENTIFIC COLLABORATOR: Dr. Joshua Klein
ROLE: Responsible for the development of experimental protocols for physiological analyses; analyses and elaboration of data; publication of results
ISTITUTION: The Volcani Center - Department of Agronomy and Natural Resources - Institute of Plant Sciences (Israele)
Email: vcjosh@agri.gov.il
SCIENTIFIC COLLABORATION :"*Eco-physiological assessment of salt-tolerant willow ecotypes for phytoremediation in semiarid environments*"
DESCRIPTION OF ACTIVITIES Eco-physiological evaluation for the selection of new salt-resistant ecotypes of willow for use in phytoremediation of semiarid regions. This includes screening for traits involved in the tolerance to drought and the co-tolerance to heavy metal accumulation for phytoextraction. Plants were assessed for: biomass production, principal parameters of photosynthesis and fluorescence, measurement of various biochemical parameters (pigments, proline, sugars) and morphological analyses (leaf expansion, opening and density of stomata).

Oct 2019 – present

SCIENTIFIC COLLABORATOR: Prof. Frantisek Baluska
ROLE: Responsible for the development of experimental protocols for biometric and electrophysiological analyses, advising of a visiting doctoral student from the University of Bonn; analyses of data and publication of results
ISTITUTION: University of Bonn – Bonn, (Germania)
Email: baluska@uni-bonn.de
SCIENTIFIC COLLABORATION *'The effects of anesthesia on plants: a physiological and electrophysiological study'*
DESCRIPTION OF ACTIVITIES A study of the physiological and electrophysiological responses in rice and Arabidopsis thaliana, as model species to study the effects of anesthetics in plants. The capacity for electrical signal propagation was evaluated in the presence and absence of anesthetics. In particular, *Arabidopsis thaliana* L. mutant for glutamate receptors (GLR) were evaluated to understand the role of GLRs in abiotic stress signaling and to determine if the pathway is similar that in animal systems. In addition, measurements of growth and rates of photosynthesis and ion flux rates.

Sept 2019 - present

SCIENTIFIC COLLABORATOR: Prof. Magdalena Daria Vaverkovà

ROLE: Main researcher responsible for biometric, physiological and biochemical measurements
ISTITUTION: Faculty of AgriSciences, Department of Applied and Landscape Ecology, Mendel University in Brno (Repubblica Ceca). Email: magda.vaverkova@uake.cz
SCIENTIFIC COLLABORATION "*Phytoremediation of landfill leachate: the potential of different herbaceous and woody species*" – Eco-physiological investigation of plants used phytoremediation of landfill leachate. The following parameters were evaluated: germination rates, growth rates, rates of gas exchange and fluorescence and biochemical parameters of the tested species.

Gen 2017 – presente

SCIENTIFIC COLLABORATOR: Prof. Michel Labrecque
ROLE: Photosynthetic and biochemical analyses; instructor of a training course (LICOR 6400; gas exchange, fluorescence); preparation of a manuscript
ISTITUTION: Plant Science Research Institute – University of Montreal, and Montreal Botanical Garden (Canada).
Email: michel.labecque@umontreal.ca
SCIENTIFIC COLLABORATION "*Photosynthetic patterns during autumn in three different* Salix *cultivars grown on a brownfield site"*
DESCRIPTION OF ACTIVITIES: A study of gas exchange rates, chlorophyll fluorescence, and pigments collected from three willow cultivars grown under stress conditions over the course of the transition between growth and dormancy.

Jul 2017 – Sept 2019

SCIENTIFIC COLLABORATOR: Prof. François Bouteau e Dr. Delphine Arbelet-Bonnin
ROLE: Responsible for physiological analyses and elaboration of data
ISTITUTION: Université Paris Diderot/Laboratoire Interdisciplinaire des Energies de Demain; Paris, France;
Email: fcabouteau@gmail.com; delphine.bonnin@univ-paris-diderot.fr
SCIENTIFICA COLLABORATION: "*Metabolism regulation during salt exposure in the halophyte* Cakile maritima*".* The activities involved the evaluation of mechanisms of tolerance to salt stress in *Cakile martima* L., a halophyte in the Brassicaceae family, in particular with regard to metabolites. In combination with analyses related to gas exchange, a complete analysis of the metablome was conducted to evaluate variations in response to moderate (100 mM) and elevated (400 mM) salt stress.

Jan 2015 – Sept/2018

SCIENTIFIC COLLABORATOR: Prof. François Bouteau ; Dr. Linda de Bont
ROLE: Responsible for physiological analyses and elaboration of data and preparation of manuscript
INSTITUTION: Université Paris Diderot/Laboratoire Interdisciplinaire des Energies de Demain ; Paris, France.

Email: fcabouteau@gmail.com; linda.debont@ips2.universite-paris-saclay.fr
SCIENTIFIC COLLABORATION: This study focused on the analyses of dormancy in seeds tied to the elevated concentrations of abscisic acid, a factor that could be interrupted by the production of ethylene stimulated by ROS. Exogenous treatments of hormones, as well as pharmacological inhibitors and promotors of proton pumps, were applied, followed by the measurement of germination rates and variations in membrane potential.

Jan 2014 – Sept 2014

SCIENTIFIC COLLABORATOR: Prof. Elizabeth Van Volkenburgh
ROLE: Responsible for biometric, physiological (ex. Gas exchange) and biochemical measurements; advising of doctoral and master's students
INSTITUTION Department of Biology – University of Washington, Seattle, Washington, USA; The International Center for Tropical Agriculture CIAT (Colombia); University of Sydney, Australia; Forshungszentrum Juelich (Germany).
Email: lizvanv@uw.edu

SCIENTIFIC COLLABORATION: The physiological responses of bean plants to drought were investigated through a variety of measurements: leaf photosynthesis, growth rates, biomass production and yield. Protocols were developed that served as the foundation of further research in the laboratory of Prof. Van Volkenburgh. Among the various parameters, measurements of gas exchange, chlorophyll fluorescence, water relations (water potentials, osmolarity and turgor), pigments, membrane integrity, growth rates and biomass production.

5. PUBLICATIONS

5.1 SCIENTIFIC ARTICLES IN INTERNATIONAL PEER-REVIEWED JOURNALS

1. Vergine M, Palm ER, Salzano AM, Negro C, Guidi Nissim W, Sabbatini L, Balestrini R, de Pinto MC, Dipierro N, Gohari G, Fotopoulos V, Mancuso S, Luvisi A, De Bellis L, Scaloni A, Vita F. 2024. Water and nutrient availability modulate the salinity stress response in *Olea europaea* cv. Arbequina. Plant Stress 14: 100648.

2. **Palm E**, Guidi Nissim W, Colasurdo G, Van Volkenburgh E. 2024. Inducible tolerance to low Ca:Mg in serpentine ecotype of *Erythranthe guttata*. Journal of Plant Physiology **303:** 154355.

3. Bruno A, Arnoldi I, Barzaghi B, Boffi M, Casiraghi M, Colombo B, Di Gennaro P, Epis S, Facciotti F, Ferrari N, Fesce E, Ficetola GF, Fumagalli S, Galimberti A, Ghisleni G, Guidi Nissim W,

Mainardi L, Manenti R, Messina V, Negri A, **Palm E**, Piga BEA, Rainisio N, Tommasi N, Labra M. 2024. The One Health approach in urban ecosystem rehabilitation: An evidence-based framework for designing sustainable cities. iScience **27**: 110959.

4. **Palm E,** Salzano AM , Vergine M, Negro C , Guidi Nissim W, Sabbatini L, Balestrini R, de Pinto MC, Fortunato S, Gohari G, Mancuso S, Luvisi A, De Bellis L, Scaloni A, Vita F. 2024. Response to salinity stress in four *Olea europaea* L. genotypes: A multidisciplinary approach. Environmental and Experimental Botany **218**: 105586

5. Atzori G, Guidi Nissim W, Mancuso S, **Palm E** (2022) Intercropping salt-sensitive Lactuca sativa L. and salt-tolerant Salsola soda in a saline hydroponic medium: an agronomic and physiological assessment. *Plants* **11** (21): 2924 DOI**:** 10.3390/plants11212924

6. Podlasek A, Vaverková MD, Koda E, Paleologos EK, Adamcová D, Bilgin A, **Palm ER**, Guidi Nissim W. (2022) Temporal variations of groundwater chemical composition in the landfill areas located near agricultural lands: A case study of the Zdounky and Petruvky landfills in the Czech Republic. *Desalination and Water Treatment*.

7. **Palm E**, Guidi Nissim W, Gagnon-Fee D, Labrecque M (2022) Photosynthetic patterns during autumn in three different *Salix* cultivars grown on a brownfield site. *Photosynthesis Research* 154 (2): 155-167. DOI: 10.1007/s11120-022-00958-z

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11. **Palm E**, Guidi Nissim W, Mancuso S, Azzarello E. (2021) Split-root investigation of the physiological response to heterogeneous elevated Zn exposure in poplar and willow. *Environmental and Experimental Botany* **183**: 104347. DOI: http://doi.org/ 10.1016/j.envexpbot.2020.104347

12. Guidi Nissim W, **Palm E*,** Pandolfi C, Mancuso S, Azzarello E. (2021) Willow and poplar for the phyto-treatment of landfill leachate in Mediterranean climate. *Journal of Environmental Management* **277**: 111454. DOI: http://doi.org/10.1016/j.jenvman.2020.111454

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18. Guidi Nissim W, **Palm E**, Mancuso S, Azzarello E. (2018) Trace element phytoextraction from contaminated soil: a case study under Mediterranean climate. *Environmental Science and Pollution Research* **25**: 9114-9131. DOI: http://doi.org/ 10.1007/s11356-018-1197-x

19. Capuana M, Colzi I, Buccianti A, Coppi A, **Palm E**, Del Bubba M, Gonnelli C. (2018) Paradoxical effects of density on measurement of copper tolerance in Silene paradoxa L. *Environmental Science and Pollution Research* **25**:1331-1339. DOI: http://doi.org/10.1007/s11356-017-0593-y

20. Caparrotta S, Boni S, Taiti C, **Palm E**, Mancuso S, Pandolfi C. (2018) Induction of priming by salt stress in neighboring plants. *Environmental and Experimental Botany* **147**: 261-270. DOI: http://doi.org/10.1016/j.envexpbot.2017.12.017

21. Taiti C, Giordani E, **Palm E**, Petrucci AW, Bennati G, Gestri G, Marone E, Azzarello E, Mancuso S. (2018) Volatile compounds from different fruit parts of two cultivars of *Cydonia oblonga*. *Advances in Horticultural Science* **32**: 105-111. DOI: http://doi.org/10.13128/ahs-22807

22. **Palm E***, Guidi Nissim W, Giordano C, Mancuso S, Azzarello E. (2017) Root potassium and hydrogen flux rates as potential indicators of plant response to zinc, copper and nickel stress. *Environmental and Experimental Botany* **143**: 38-50. DOI: http://doi.org/ 10.1016/j.envexpbot.2017.08.009

23. Redwan M, Spinelli F, Marti L, Weiland M, **Palm E**, Azzarello E, Mancuso S. (2016) K^+ fluxes and ROS production as indicators of salt tolerance in Cucumis sativus. *Functional Plant Biology* **43**:1016-1027. DOI: http://doi.org/10.1071/FP16120

24. **Palm E***, Brady K and Van Volkenburgh E. (2012) Serpentine tolerance in *Mimulus guttatus* does not rely on exclusion of magnesium. *Functional Plant Biology* **39**: 670-688. DOI: http://doi.org/10.1071/FP12059

The symbol * identifies the corresponding author.

5.2 BOOK CHAPTERS

1. **Palm E*** and Van Volkenburgh E. (2014) Physiological adaptations of plants to serpentine soil. In: Plant Ecology and Evolution in Harsh Environments. Pages 129-147. Eds. Rajakaruna, N; Boyd, B; Harris, T. Nova Science, Hauppauge, NY. ISBN: 978-163321998-4, 978-163321955-7

The symbol * identifies the corresponding author.

6. PARTICIPATION AT INTERNATIONAL CONFERENCES

6.1 ORAL PRESENTATIONS AT INTERNATIONAL CONFERENCES (PRESENTER)

1. **Palm E**, Van Volkenburgh E. (2023) *"Making use of the broad nature of study abroad programs to include Plant Behavior"*. 6th International Symposium on Plant Signaling and Behavior. Seattle, WA (USA) June 18-22 2023
2. **Palm E,** Vita F, Luzzetti L, Redwan M, Mancuso S, Masi E. (2023) *"Amplification of sucrose-stimulated growth increase by continuous 200 Hz sound in wild type* Arabidopsis thaliana *Col."* 6th International Symposium on Plant Signaling and Behavior. Seattle, WA (USA) June 18-22 2023
3. **Palm E,** Van Volkenburgh E. (2023) "*Serpentine tolerance in* Mimulus guttatus*: Gradual acclimation to low Ca:Mg"*. 12th International Conference on Serpentine Ecology. Nancy, France, June 12-16, 2023.
4. **Palm E***., Atzori G., Guidi Nissim W., (2022) "*Leaf-level physiological responses of* Lactuga sativa *intercropped with* Salsola soda *in biosaline agriculture*". Online Second International Laayoune Forum on Biosaline Agriculture 29–31 Mar 2022
5. **Palm E***, Brady K and Van Volkenburgh E. (2011) "*Physiological basis for serpentine tolerance in* Mimulus guttatus." 7th International Conference on Serpentine Ecology. Coimbra, Portugal, June 2011 (Oral Presentation)
6. **Palm E*** and Van Volkenburgh E. (2010) "*The Serpentine Syndrome: Investigating potential mechanisms for tolerance in* Mimulus guttatus. Improving Tolerance of Common Bean to Abiotic Stress Workshop. International Center for Tropical Agriculture (CIAT). Cali, Colombia, November 2010. (Oral presentation)

6.2 ORAL PRESENTATIONS AT NATIONAL CONFERENCES (PRESENTER)

1. Palm E, Guidi Nissim W, Atzori G, Labra M. 2024. Cu stimulates Zn accumulation but reduces biomass of *Salix matsudana* L. under heterogeneous supply. Federazione Italiana Scienza della Vita. Padua, Italy, 18-20 September 2024.
2. **Palm E**, Atzori G, Bazihizina N, Mancuso S, Renna L. (2023) *"Constitutive sodium compartmentalization patterns differentially affect biomass production of two salt-treated edible halophytes"* Società Italiana di Biologia Vegetale. Bari, Italy, 11-14 September 2023.
3. **Palm E*** and Van Volkenburgh E. "The Serpentine Syndrome: Investigating Potential Mechanisms of Tolerance in Mimulus guttatus". Western Meeting of the American Society of Plant Biologists, WSU, Pullman, Washington, April 2010

6.3 POSTER AT INTERNATIONAL CONFERENCES

1. **Palm E**, Colzi, I, Mancuso S and Gonnelli, C. "Copper-induced changes in net H^+ and K^+ fluxes of Silene paradoxa roots". 3rd International Symposium on Plant Signaling and Behavior, Paris, France, July 2015. (Poster)
2. **Palm E**, and Van Volkenburgh E. "How does Mimulus guttatus tolerate serpentine (high Mg:low Ca) conditions?" Annual Meeting of the American Society of Plant Biology, Portland, Oregon, July 2014 (Poster)
3. **Palm E** and Van Volkenburgh E. "A comparison of Mg localization in serpentine tolerant and non-tolerant Mimulus guttatus." 4th Pan American Plant Membrane Biology Workshop. Asilomar, CA, May 2012 (Poster)
4. **Palm E** and Van Volkenburgh E. "The serpentine syndrome – Is Calcium the only limiting factor?" Annual Meeting of the American Society of Plant Biologists, Honolulu, Hawaii, July 2009. (Poster)

6.4 POSTER AT NATIONAL CONFERENCES

1. Palm E., Guidi Nissim W., Azzarello E., Mancuso S. (2019). *"A split root investigation of the physiological response to heterogenous elevated Zn exposure in poplar and willow"*. 114° Congresso della Società Botanica Italiana Padova, 4 - 7 September 2019 (Poster).

6.5 PARTECIPATION AT CONFERENCES (NOT AS PRESENTER)

1. Guidi Nissim W. *, **Palm E.,** Labra M. (2022) "*Integrating ecosystem services into phytoremediation: new insights for a more sustainable management of urban brownfields*" 4th ESP Europe, Conference Heraklion, 10-14 October 2022, Greece
2. Guidi Nissim W. *, **Palm E.**, Labra M. (2022) *"New insights for a sustainable use of phytoremediation for brownfield clean-up*" 2nd International Conference on Botany and Mycology, Sofia 19–20 September 2022, Sofia, Bulgaria
3. Atzori G.*, **Palm E.**, Guidi Nissim W., (2022) "*An agronomic assessment for intercropping salt sensitive and salt tolerant species in a saline hydroponic medium*". Online Second International Laayoune Forum on Biosaline Agriculture 29–31 Mar 2022
4. Guidi Nissim W.*, **Palm E.**, Camilla Pandolfi, Stefano Mancuso, and Elisa Azzarello (2021) "*Willow and poplar filters for the treatment of landfill leachate under Mediterranean climate*" 26th Session International Poplar Commission. FAO 5 – 8 October 2021 Rome (Italy). (Oral presentation).
5. Guidi Nissim W.*, **Palm E.,** Stefano Mancuso, and Elisa Azzarello (2021) "*Fast-growing trees for the extraction of trace elements on military sites: two case studies in Southern and Northern Italy"* 26th Session International Poplar Commission. FAO 5 – 8 October 2021 Rome (Italy). (Oral presentation).

6. Santini G*., Guidi Nissim W., **Palm E.,** Biondi N., Tredici M., Rodolfi L. (2018) "*Effect of foliar application of an Arthrospira sp. based extract on hydroponically grown lettuce (Lactuca sativa L. var. capitata)*" Algaeurope 2018 International Conference 4-6 December Park Plaza Amsterdam Airport Hotel -The Netherlands (Oral presentation).

7 Guidi Nissim W*., E. Azzarello, **Palm E.,** S. Mancuso. (2017) "*The performance of four selected species for phytoextraction of trace elements under Mediterranean conditions*". 14th International Phytotechnologies Conference (International Phytotechnology Society), September 25 to 29 2017, Montreal (Canada). (Oral presentation).

8 Guidi Nissim, W*., **Palm E**., Mancuso S., Azzarello E. (2019) "Poplar, willow and eucalyptus for the phytoremediation of polluted soils in urban areas: two case studies in Southern and Northern Italy". XII Congresso Nazionale SISEF "La scienza utile per le foreste: ricerca e trasferimento", Palermo, 12-15 Novembre 2019 (Oral presentation).

7. ADVISING ACTIVITIES

7.1 BACHELORS THESIS

Titolo: "*Messa a punto e valutazione di idrogel funzionalizzati per applicazioni in campo agronomico".* CandidatE: Luca Antonello, Relatore: prof.ssa Alessandra Cincinelli - Università degli Studi di Firenze, A.A. 2021-2022

7.2 ADVISING OF THESIS AND INTERNSHIP STUDENTS

- 2022 - Felipe Yamashita de Oliviera – Department of Cell Biology, University of Bonn (1 mese) – '*Characterization of Morphological and Cellular Roles of* Arabidopsis thaliana *AtGLR3.7 in Plant Growth and Physiology*'

- 2022 – Lucia Sylvain-Bonfanti – UFR Sciences – Aix-Marseille Université – Marseille, France (3 mesi) – '*Impact of lidocaine on plant cell ion channels in culture and electrical responses on plant tissu*e'

- 2020 – Roberto Ciaraolo - Scuola di Scienze Matematiche Fisiche e Naturali – Università degli Studi di Firenze – (3 mesi) - *"Messa a punto di idrogel per il rilascio controllato di principi attivi*"
- Dec 2017 – Sett 2018 – Laura Luzzietti - Dipartimento di Scienze Ecologiche e Biologiche - Università degli Studi della Tuscia - Corso di laurea magistrale in Biologia Cellulare e Molecolare – (10 mesi) - '*Risposta fisiologica in piante di* Arabidopsis thaliana *L. sottoposte a frequenza sonora continua di 200 Hz'*

8. EDITORIAL ACTIVITY

8.1 EDITORIAL COMMITEE OF INTERNATIONAL JOURNALS

- **Member of the Editorial Board** of the international journal "BMC Plant Biology" https://bmcplantbiol.biomedcentral.com/about/editorial-board

- **Coordinating Editor** of the international journal "*Restoration Ecology*" https://onlinelibrary.wiley.com/page/journal/1526100x/homepage/editorialboard.html

- **Member of the Editorial Board** of the international journal "*Plant Signaling and Behavior"* https://www.tandfonline.com/action/journalInformation?show=editorialBoard&journalCode=kpsb20

- **Member of the Editorial Board (Review Editor)** of the international journal "*Frontiers in Plant Science: Functional Plant Ecology*" https://www.frontiersin.org/journals/plant-science/sections/functional-plant-ecology#editorial-board

- **Member of the Editorial Board** of the journal "*Advances in Horticultural Science*" https://oaj.fupress.net/index.php/ahs/about/editorialTeam

- **Guest Editor** of the journal "*Horticulturae"*, Special Issue "*Advances in Characterizing and Improving Biotic and Abiotic Stress Tolerance in Ornamental Trees* https://www.mdpi.com/journal/horticulturae/special_issues/ornamental_tolerance

- **Guest Editor** of the journal "*Frontiers in Plant Science"*, Special Issue "*Women in Plant Cell Biology*" https://www.frontiersin.org/research-topics/38208/women-in-plant-cell-biology-2022

8.2 SUMMARY OF PEER-REVIEW ACTIVITY

Advances in Horticultural Science (4); Agronomy (3); Chemosphere (1); Environmental and Experimental Botany (3); Forests (5); Frontiers in Plant Science (7); Horticulturae (3); iForest (2); Journal of Enviromental Management (3) Journal of Experimental Botany (1); Restoration Ecology (4); Plant Signaling and Behavior (1); Process Safety and Environmental Protection (1); Plants (1)

9. AWARDS AND RECOGNITION

09/06/2014 Meeting Travel Award (ASPB) Department of Biology; University of Washington; $640

04/2011 STF Proposal No. 2011-022-01; Student Technology Fee Fund; University of Washington; Funds for Licor 6400 system; $60,150

04/2009 ASPB Meeting Travel Award; American Society of Plant Biologists; $800

05/2008 Sargent Award for research related materials and travel; Department of Biology; University of Washington; $600

31/03/2008 Graduate Research Fellowship National Science Foundation; $90,000

09/2006 Plant Biology Fellowship Award; Department of Biology; University of Washington; $21,024