

## **PERSONAL INFORMATION**

Family and First name: BALESTRINI, Raffaella Maria

Researcher unique identifiers: 0000-0001-7958-7681 (ORCID) – 55511748681 (Scopus Author ID)  
Q-1106-2015 (Researcher ID)

Nationality: Italian

## **CURRENT POSITIONS**

1<sup>st</sup> Oct. 2019- Research Director at IPSP-CNR

## **PUBLICATIONS**

I have 107 scientific publications and 2 editorials, in peer-reviewed indexed journals, and 17 book chapters (1 in press). According to Scopus, my total H-index is 36.

## **RESEARCH INTERESTS**

Main objectives are to study the mechanisms involved plant-soil microorganism interactions, with particular focus on mycorrhizal symbioses, as well as to investigate the plant responses to diverse environmental and growth conditions. Current research interests are: Cellular and molecular aspects of plant development and interactions; Improvement of plant growth and production of specialized metabolites in response to abiotic and biotic environmental factors; Plant response to biotic and abiotic stresses; Genomics/transcriptomics of symbiotic fungi and transcriptomics of plant tissues and homogeneous cell-type populations. Competence sectors: Plant Biology, Plant Nutrition, Plant-Microbe Interactions, Root symbioses, Soil microorganisms, Transcriptomics.

## **RESEARCH ACHIEVEMENTS**

I contributed to elucidate different aspects related to the interface creation and nutritional exchanges in mycorrhizal symbioses. By applying a laser microdissection (LMD) approach, I contributed to obtain new knowledge on the cell-specificity in arbuscular mycorrhizal (AM) roots. The first manuscript on the application of LMD to AM symbiosis (Balestrini et al. 2007 MPMI, 20:1055-1062) has been recommended by Susan Barker (F1000 Factor 3.0 Recommended), F1000Prime «Article recommendations». Thanks to the participation at diverse international consortia, I have contributed to highlight the genome features of different mycorrhizal fungi. More recently, I contributed to obtain novel information on the mechanisms involved in AM symbiosis-mediated plant tolerance to abiotic stresses.

## **EDUCATION**

1996 PhD in Fungal Biology and Biotechnology, Turin University, IT

1991 Degree in Biological Sciences, Turin University, IT

## **RESEARCH TRAINING and FELLOWSHIPS**

1996–1998 Post-doc Research assistant at Plant Biology Department, Turin University, IT

1992-1993-1996 Short research training (3), Dep. de Genética Molecular, CID-CSIC, Barcelona, SP

1991-1993 Short research training (2), Universität Konstanz, Fakultät für Biologie, Konstanz, DE

1991-1992 CNR scholarship for research activity at CSMT-CNR, Torino, IT

## **PREVIOUS POSITIONS**

2007–2019 Senior Researcher (II level) at IPSP-CNR

1998-2006 Researcher (III level) at IPP-CNR

## **AWARDS**

2015 Marcello Sgarlata Award, upon designation by CNR President, for her research activities in the plant biology field

2010 DAA2009 award (research area: plant and animal genomics) for the project Insight into the symbiotic life-style of the black truffle *Tuber melanosporum*: a Laser MicroDissection (LMD) approach

## **SUPERVISION OF GRADUATE STUDENTS AND POSTDOCTORAL FELLOWS**

2006-2018 Tutor of 14 MSs/3 PhD students, 1 Post-doc

2006-2019 Supervisor of several Visiting PhD students and Post-docs

### **TEACHING ACTIVITIES**

2020 Teaching activity for the “Cellular and Molecular aspects of Biological Interactions” course, PhD in Biology and Applied Biotechnology (4 hours)

1999-2020 Seminars and practical lessons for Bachelors and Masters courses

### **ORGANISATION OF SCIENTIFIC MEETINGS and COURSES**

2018-2019 Organizing committee, iMMM2019 (international Molecular Mycorrhiza Meeting), 7-8 Feb. 2019, Torino-IT

2016 Scientific Committee, XXI Convegno Nazionale di Micologia, 12-13 Sep. 2016, L'Aquila-IT

2016 Co-organizer of courses on optical and confocal microscopy for IPSP-CNR (Torino 4-5 May 2016; Genova Nikon-IIT, 2-3 Feb. 2017)

2015 Organizing Committee, Tuber Genomics Meeting, 16-17 Oct. 2015, Alba-IT

2006 Organizing Committee, INTEGRAL Workshop on cell biology applied to plant microbe interactions, 7-10 June 2006, Torino-IT

### **SCIENTIFIC MEETING COMMUNICATIONS**

2005-2020 Invited Lectures at Conferences/Summer Schools, Seminars (9)

2017 Oral presentation: “Sustainable soil management to reduce agricultural inputs: what is the role of soil microorganisms?” Side Event, 5<sup>th</sup> Global Soil Partnership Plenary Assembly, 22 June 2017, FAO

2016 Speaker at the Gordon Research Conference on Salt & Water Stress in Plants (selected poster)

1994-2015 Other National and International Oral Presentations (15)

### **INSTITUTIONAL RESPONSIBILITIES AND OTHER SYNERGISTIC ACTIVITIES**

2021- CNR working group for the participation at the “Cluster Agrifood Nazionale CL.A.N.”

2021- Member of the INCREASE stakeholder consortium

2020- Italian Spatial Agency (ASI) thematic table “Biological Systems Supporting the Life”

2020- IPSP-CNR working groups on seminars and VQR evaluation

2020- CNR evaluation panel for bilateral projects

Oct. 2019- Manager of the IPSP-CNR Turin Unit

2016-2017 CNR contact point for the organization of an event on soil within the CNR/CREA/ENEA/FAO MoU, Seminar series (22 June 2017, FAO)

2016- Member of the Pillar 3 - Italian Global Soil Partnership

2016-2017 Participation to the Joint Steering Committee within the MoU CNR and Helmholtz

2017 Evaluation Panel Member for a CNR Researcher (III level)

2015-2016 Member of GEV ANVUR Area 05 for the VQR 2011-2014

2014 Participation at the bilateral Conference on Innovative Technologies for the Agriculture in Desert and Dry Environments “Greening the World”, 2 June 2014, TAU, Tel Aviv, Israel (DiSBA and INRIM delegation)

2014-2017 Manager of the IPSP (formerly IPP) Torino Unit

2011-2014 Responsible for the IPP-CNR research line Biodiversity in agricultural and forestry systems: genetic, molecular and epigenetic basis

2010-2011 Evaluation Panel Member for 4 CNR Researcher (III level) positions

Since 2006 Member of several evaluation committees (temporary hiring of research personnel)

### **MEMBERSHIPS OF SCIENTIFIC SOCIETIES**

EWG-NUE (Expert Working Group–Nutrient Use Efficiency in wheat), CNR supporting scientist for EPSO (European Plant Science Organization; 2021-2023), SIBV (Società Italiana Biologia Vegetale)

Past memberships: American Society Plant Biology (ASPB), MPMI

### **EDITORIAL BOARDS AND REVIEWER ACTIVITY**

2020- Editor-in-Chief, Section Fungi-plant interactions, *Frontiers in Fungal Biology*; Editorial Board (EB) member, *Plant Stress*; section EB member, *Plants*; Advisory Board member, *Challenges*

2020- Associate Editor for the Plant Symbiotic Interactions Section (*Frontiers in Plant Science*)

2019-2021 Section Editor (*Fungal Biology*) for the “Encyclopedia of Fungi”, Elsevier

2019- EB member for Scientific reports and Journal of Fungi  
2018- IJMS (section Molecular Plant Science) EB and Editor for Fungal Biology  
2017-2020 Associate Editor (AE) for the section Fungi and their interactions, Frontiers in Microbiology  
2017- Review Editor, section “Plant Physiology”, Frontiers in Physiology  
2015- Associate Editor, BMC Genomics, section Eukaryote microbial genomics  
2013- Academic Editor, Plos ONE  
2009- Biology & Fertility of Soils, EB member,  
2006- Scientific Reviewer for several international journals

## **GRANT EVALUATION and PANELS**

### *European projects*

2017-2018-2019-2020 Evaluation panel for the Marie Curie fellowships (in 2019 and 2020 expert and rapporteur)

2013-2015 Evaluation of two ERC grants (starting and advanced grant, respectively)

### *Other projects*

2020 ESF Evaluation Panel, Large-scale Research Programmes «Grands programmes de Recherche (GPR)» - University of Bordeaux; Panel Member

2019 Novo Nordisk Foundation Committee on the Challenge Programme – Modern Plant Science – towards a sustainable world, Panel Member

### Research grant evaluation

2005-2015-2016-2017-2018-2019 Several Italian Institutions, including Universities, Regional Institutions, MIUR and MISE

2019-2021 European Science Foundation, FWO program

2018-2019 Agence National delle Recherche (ANR, Francia), Generic Call 2018, 2019

2019 Graduate Women in Science (GWIS) National Fellowship Program

2018-2019 European Plant Phenotyping Network (EPPN 2020)

2017-2019 FONDECYT (Chile)

2018 Center for the Synthesis and Analysis of Biodiversity (CESAB) - French Foundation for Research on Biodiversity (FRB), 2018 call

2017 Welsh Government’s Sêr Cymru II Programme

2017 Marsden Fund-Royal Society Te Apārangi (New Zealand)

2015 Netherlands Organization for Scientific Research (NOW); Royal Society, DFID Africa Capacity Building Initiative. Programme Grant, UK

2014 German Research Foundation (DFG), Emmy Noether Program

2009 National Science Foundation (NSF), USA

## **CURRENT and PREVIOUS RESEARCH GRANTS, as Principal Investigator/Project Partner (PI)**

2021-2024 Project partner, PRIMA call 2020 section 2 - MULTI-TOPIC (RESCHEDULE-RESilient to Climate CHange Extremes MeDiterranean AgricUltural Systems: LEveraging the Power of Soil Health and Associated Microbiota); WP Leader

2021-2024 Project partner, PRIMA call 2020 section 2 - MULTI-TOPIC (OPTIMUS PRIME-OPTIMAl USage of natural product and biological PRIMing agents to improve rESilience of agrosystems to climate change); WP leader

2020-2023 Project partner, Fonds de Soutien à l'Obtention Végétale–FSOV, Phosphorus use efficiency and genetics of bread wheat; PI, root phenotyping activities

2020- PI, CNR FOE 2019, Green and Circular Economy Project; WP leader

2019-2022 PI, EU Project UIA (Prato Urban Jungle); inserted in the CNR Unit, soil metagenomics activities

2014-2015 PI, MIUR-Progetto Premiale, Sustainable Agricultural Water management (AQUA); Task leader

2008-2010 Project partner, Italian National MIUR project (PRIN2007), FUNGENTm; UR2 leader

2007-2010 PI, Regione Piemonte Project, Integrated technology platform supporting the quality and safety of typical wines of Piedmont–Italy (Tech4Wine); WP leader

## **OTHER PROFESSIONAL INFORMATION**

Qualified as Full Professor (Abilitazione Scientifica Nazionale 2012), 05/A1 (Botany) sector

## 25 SELECTED PUBLICATIONS (§Corresponding author)

- VITA F, GHIGNONE S, BAZIHIZINA N<sup>§</sup>, RASOULI F, SABBATINI L, KIANI-POUYA A, KIFERLE C, SHABALA S, BALESTRINI R<sup>§</sup>, MANCUSO S (2021) Early responses to salt stress in quinoa genotypes with opposite behaviour. *Physiologia Plantarum*. DOI: 10.1111/PPL.13425
- BALESTRINI R, BRUNETTI C, CAMMARERI M, CARETTO S, CAVALLARO V, COMINELLI E, DE PALMA M, DOCIMO T, GIOVINAZZO G, GRANDILLO S, LOCATELLI F, LUMINI E, PAOLO D, PATANÈ C, SPARVOLI F, TUCCI M, ZAMPIERI E (2021) Strategies to Modulate Specialized Metabolism in Mediterranean Crops: From Molecular Aspects to Field. *International Journal of Molecular Sciences* 22:2887.
- BRUNETTI C, SALEEM AR, DELLA ROCCA G, EMILIANI G, DE CARLO A, BALESTRINI R, KHALID A, MAHMOOD T, CENTRITTO M (2021) Effects of PGPR strains producing ACC deaminase on photosynthesis, isoprene and ethylene emissions and growth of *Mucuna pruriens* (L.) DC. in response to water deficit. *Journal of Biotechnology* 33:53-62.
- <sup>§</sup>BALESTRINI R, BRUNETTI C, CHITARRA W, NERVA L (2020) Photosynthetic Traits and Nitrogen Uptake in Crops: Which Is the Role of Arbuscular Mycorrhizal Fungi? *Plants* 9, 1105.
- GHIRARDO A, FOCHI V, LANGE B, WITTING M, SCHNITZLER J-P, <sup>§</sup>PEROTTO S, <sup>§</sup>BALESTRINI R (2020) Metabolomic adjustments in the orchid mycorrhizal fungus *Tulasnella calospora* during symbiosis with *Serapias vomeracea*. *New Phytologist* 228:1939-1952.
- IRANKHAH S, CHITARRA W, NERVA L, ANTONIOU C, LUMINI E, VOLPE V, GANJEALI A, CHENIANY M, MASHREGHI M, FOTOPOULOS V, <sup>§</sup>BALESTRINI R (2020) Impact of an arbuscular mycorrhizal fungal inoculum and exogenous MeJA on fenugreek secondary metabolite production under water deficit. *Environmental and Experimental Botany* 176:104096.
- MANNINO G, NERVA L, GRITLI T, NOVERO M, FIORILLI V, BACEM M, BERTEA CM, LUMINI E, CHITARRA W, <sup>§</sup>BALESTRINI R (2020) Effects of Different Microbial Inocula on Tomato Tolerance to Water Deficit. *Agronomy* 10, 170.
- <sup>§</sup>BALESTRINI R, GHIGNONE S, QUIROGA G, FIORILLI V, ROMANO I, GAMBINO G (2020) Long-Term Impact of Chemical and Alternative Fungicides Applied to Grapevine cv Nebbiolo on Berry Transcriptome. *International Journal of Molecular Sciences* 21, 6067.
- <sup>§</sup>BALESTRINI R, ROSSO LC, VERONICO P, MELILLO MT, DE LUCA F, FANELLI E, COLAGIERO M, SALVIOLI DI FOSSALUNGA A, CIANCIO A, PENTIMONE I (2019) Transcriptomic Responses to Water Deficit and Nematode Infection in Mycorrhizal Tomato Roots. *Frontiers in Microbiology* 10:1807.
- BRILLI F, POLLASTRI, S, RAI, A, BARALDI R, NERI L, BARTOLINI P, PODDA A, LORETO F, MASERTI BE, BALESTRINI R (2019) Root colonization by *Pseudomonas chlororaphis* primes tomato (*Lycopersicon esculentum*) plants for enhanced tolerance to water stress. *Journal of Plant Physiology* 232:82-93.
- CHIALVA M, FANGEL JU, NOVERO M, ZOUARI I, SALVIOLI DI FOSSALUNGA A, WILLATS WGT, BONFANTE P, <sup>§</sup>BALESTRINI R (2019) Understanding changes in tomato cell walls in roots and fruits: the contribution of arbuscular mycorrhizal colonization. *International Journal of Molecular Science* 20:415.
- MURAT C, PAYEN T, NOEL B, KUO A, MORIN E, CHEN J, KOHLER A, KRIZSÁN K, BALESTRINI R, ET AL. (2018) Genomes of Pezizomycetes reveal molecular basis of Tuberaceae lifestyle. *Nature Ecology & Evolution* 2: 1956–1965.
- VOLPE V, CHITARRA W, CASCONI P, VOLPE MG, BARTOLINI P, MONETI G, PIERACCINI G, DI SERIO C, MASERTI B, GUERRIERI E, <sup>§</sup>BALESTRINI R (2018) The association with two different arbuscular mycorrhizal fungi differently affects the water stress tolerance in tomato. *Frontiers in Plant Science* 9:1480.
- CATOLA S, CENTRITTO M, CASCONI P, RANIERI AM, LORETO F, CALAMAI L, <sup>§</sup>BALESTRINI R, GUERRIERI E (2018) Effects of single or combined water deficit and aphid attack on tomato volatile organic compound (VOC) emission and plant-plant communication. *Environmental and Experimental Journal* 153:54-62.
- <sup>§</sup>BALESTRINI R, CHITARRA W, ANTONIOU C, RUOCCO M, FOTOPOULOS V (2018) Improvement of plant performance under water deficit with the employment of biological and chemical priming agents. Themed Issue: Assessment and monitoring of crop water use and productivity under present and future climate. *Journal of Agricultural Science* 156(5).
- FOCHI V, FALLA N, GIRLANDA M, <sup>§</sup>PEROTTO, S, <sup>§</sup>BALESTRINI R (2017) Cell-specific expression of plant nutrient transporter genes in orchid mycorrhizae. *Plant Science* 263:39-45.

FOCHI V, CHITARRA W, KOHLER A, VOYRON S, SINGAN VR, LINDQUIST E, BARRY K, GIRLANDA M, GRIGORIEV IV, MARTIN F, §BALESTRINI R, §PEROTTO S (2017) Fungal and plant gene expression in the *Tulasnella calospora* - *Serapias vomeracea* symbiosis provides clues on pathways in orchid mycorrhizas. *New Phytologist* 213:365-379.

§BALESTRINI R, SALVIOLI A, DAL MOLIN A, NOVERO M, GABELLI G, PAPARELLI E, MARRONI F, BONFANTE P (2017) Impact of an arbuscular mycorrhizal fungus *versus* a mixed microbial inoculum on the transcriptome reprogramming of grapevine roots. *Mycorrhiza* 27:417-430.

CHITARRA W, PAGLIARANI C, MASERTI BE, LUMINI E, SICILIANO I, CASCONI P, SCHUBERT A, GAMBINO G, §BALESTRINI R, GUERRIERI E (2016) Insights on the impact of arbuscular mycorrhizal symbiosis on tomato tolerance to water stress. *Plant Physiology* 171:1009-1023.

BERRUTI A, LUMINI E, §BALESTRINI R, BIANCIOTTO V (2016) Arbuscular Mycorrhizal Fungi as Natural Biofertilizers: Let's Benefit from Past Successes. *Frontiers in Microbiology* 6:1559

FASOLI M, DELL'ANNA R, DAL SANTO S, BALESTRINI R, SANSON A, PEZZOTTI M, MONTI F, ZENONI S (2016) Pectins, hemicelluloses and celluloses show specific dynamics in the internal and external surfaces of grape berry skin during ripening. *Plant and Cell Physiology* 57:1332-1349.

TISSERANT E, MALBREIL M, KUO A, KOHLER A, SYMEONIDI A, BALESTRINI R ET AL. (2013) The genome of an arbuscular mycorrhizal fungus provides insights into the oldest plant symbiosis. *Proceedings of the National Academy of Sciences of the United States of America* (PNAS) 110:20117-20122.

TISSERANT E, KOHLER A, DOZOLME-SEDDAS P, BALESTRINI R et al. (2012) The transcriptome of the arbuscular mycorrhizal fungus *Glomus intraradices* (DAOM 197198) reveals functional tradeoffs in an obligate symbiont. *New Phytologist* 193:755-769.

MARTIN F, ^KOHLER A, ^MURAT C, ^BALESTRINI R, ^COUTINHO P, ^JAILLON O, ^MONTANINI B, ^MORIN E, ^NOEL B, ^PERCUDANI R, ^PORCEL B, ^RUBINI A ET AL. (2010) Perigord black truffle genome uncovers evolutionary origins and mechanisms of symbiosis. *Nature* 464:1033-1038. ^Contributed equally to this work as second authors.

BALESTRINI R, GOMEZ-ARIZA J, LANFRANCO L, BONFANTE P (2007) Laser microdissection reveals that transcripts for five plant and one fungal phosphate transporter genes are contemporaneously present in arbusculated cells. *Molecular Plant-Microbe Interactions* 20:1055-1062.