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### **Interests and present fields of work**

Research in forest ecophysiology is intended to produce biological knowledge that can be used for sustainable forest management.

The forest ecophysiology research program focuses on:

- The relationship between terpenes and the attack of pest and diseases.
- Characterization of less susceptible terpene chemotypes to the attack of insects and fungi.
- The effect of abiotic stresses on biosynthesis of volatile terpene compounds.
- Variation of ecophysiological responses to biotic and abiotic stresses.

### **Degree and post-degree experience**

1985 Graduated in Agricultural Science, University of Firenze Italy. 1982 with 110/110. His thesis concerned utilization of forestry biomass for production of chemicals.

1988 CNR fellowship at Department of Forestry, University of Florida, Gainesville, Florida, USA, July 1988 - February 1989 to perform studies on terpenes as biochemical markers in forest genetics under the supervision of Prof. A. Squillace and Prof. T. White and to conduct experiments in plant ecophysiology under the supervision of Prof. J. Johnson.

1989 CNR fellowship at Laboratoire d'Amélioration des Arbres Forestiers, INRA, Pierroton (France), November 1989 - January 1990 to perform studies on terpenes as biochemical markers in forest genetics under the supervision of Prof. P. Baradat.

1991 N.A.T.O.-CNR fellowship, at Department of Forestry, University of Florida, Gainesville, Florida, USA, June 1991 - August 1991 to perform studies on terpenes as biochemical markers in forest genetics under the supervision of Prof. A. Squillace and Prof. T. White and to conduct experiments in plant ecophysiology under the supervision of Prof. J. Johnson.

1996 CNR fellowship at Department of Entomology, University of Wisconsin, Madison, Wisconsin, USA, June 1996 to perform studies on terpenes as biochemical markers in forest genetics under the supervision of Prof. K. Raffa.

1997 CNR fellowship at Department of Forestry, University of Florida, Gainesville, Florida, USA, April 1997, to perform studies on terpenes as biochemical markers in forest genetics under the supervision of Prof. A. Squillace and Prof. T. White and to conduct experiments in plant ecophysiology under the supervision of Prof. J. Johnson.

1997 N.A.T.O.-CNR fellowship, at Department of Entomology, University of Wisconsin, Madison, Wisconsin, USA, June 1997 - August 1997 to perform studies on terpenes as biochemical markers in forest genetics under the supervision of Prof. K. Raffa.

### **Career**

1986-2005 Researcher (permanent position, III level) at Istituto di Genetica Vegetale (IGV), Area di Ricerca CNR di Firenze.

2005 Senior researcher (II level) at CNR-IGV, Area di Ricerca CNR di Firenze.

### **Other professional experiences**

1987-1989 Responsible of the research line "Study of genetic variation in terpene composition of forest plants by gas chromatography" of C.N.R. Istituto di Genetica Vegetale

1993-1998 Responsible of the research line "Genetic variation and physiological adaptability in forest plants" of C.N.R. Istituto di Genetica Vegetale

1999-2003 Responsible of the research line "Analysis of the ecophysiological and biochemical responses of the plant to biotic and abiotic stresses" of C.N.R. Istituto di Genetica Vegetale

2004-2005 Responsible of the research macroline "Plant interactions with biotic and abiotic stresses present in the surrounding environment" of C.N.R. Istituto di Genetica Vegetale

2004-2000 Responsible of the Joint Laboratory for Gas chromatography of plant metabolites between C.N.R. Istituto di Genetica Vegetale Firenze and Perkin-Elmer Italia S.p.A

1998-present Coordinator of the Working Group on "Terpenes and Ecology" of the Società Italiana di Selvicoltura ed Ecologia Forestale (SISEF)

2012 Employment contract for 2 months at the Ionicon Analytic GmbH., in the framework of FP7-IAPP Marie Curie PTR-TOF Nr. 218065, July - August 2012.

2015-2021 Responsible of the Laboratory for the Analysis and Research in Environmental Chemistry (ARCA) of C.N.R.

## Teaching experience

### Courses

2004-2005 Course of Gaschromatografy for the analysis of essential oil in plant species used in Pharmacopoeia at the Faculty of Pharmacy, University of Firenze, ITALY.

1999-2000 Coordinator of the Course Wood technology at the Faculty of Agricultural and Forestry Sciences, University of Firenze, ITALY.

1999-2000 Course of Wood chemistry extractives at the the Faculty of Agricultural and Forestry Sciences, University of Firenze, ITALY.

1998-1999 Course of Wood chemistry extractives at the Faculty of Agricultural and Forestry Sciences, University of Firenze, ITALY.

### Mentor training

Supervisor of High School, M.S., Ph.D and Postdoc students.

### Editorial activity - evaluator expertise

Referee for several international journals in the field of plant science and chromatography: Forest Genetics, Journal of Chromatography A., Annals of Forest Science, Plant Byosystems, Biochemical Systematics and Ecology, Tree Physiology, Journal of Essential Oil, iForest

Associate Editor of the on-line journal Forest@

Component of the Component of the Advisory review board of the on-line journal iForest-Biogeosciences and Forestry

### Grants

1989 One year bilateral project CNR-INRA (Laboratoire d'Amelioration des Arbres Forestiers Pierroton (Francia) to study the variation in terpene composition of *Pinus halepensis* Miller.

1990 One year bilateral project CNR- Department of Forestry, University of Florida to study the physiological and biochemical mechanisms of the plant in response to environmental stress.

1991-1995 Participant in the project RAISA-CNR dal titolo "Processi idrologici, ecofisiologici ed ecogenetici in boschi di faggio" occupandosi dell'analisi dei meccanismi fisiologici in risposta al variare dei fattori ambientali

1997-2001 Participant in the project of European Commission "Global, physiological and molecular responses to climatic stresses of three Mediterranean conifers", Contract INCO-FORADAPT C18-CT97-0200.

1997-2001 Participant in the project of European Commission "Identification of ecophysiologically adapted indigenous *Milicia excelsa* genotypes for sustainable tropical timber production", Contract INCO - DC ERB3514PL961724.

1997-2001 Participant in the project of European Commission "Adaptation and selection of mediterranean *Pinus* and *Cedrus* for sustainable afforestation of marginal lands", Contract FAIR CT95-0097

2001-2004 Coordinator of Workpackage "Terpene Analysis" and Workpackage "Molecular Markers" within the European Commission project "Quality of life and management of living resources resistance of spruce to root and butt rot disease" (RESROBS Contract QLRT-2000-00241).

2001-2007 Participant in the international project of "Conifer defense against insects and phytopathogenic fungi - CONDEF"

2004-2005 Coordinator of the project "Caratterizzazione e produzione di oli essenziali e di estratti di natura polifenolica di ecotipi toscani della flora mediterranea " contract between A.R.S.I.A Regione Toscana and IGV-CNR.

2005-2009 Participant in the project of European Commission "Developing best practice for seed sourcing of planted and natural regeneration in the neotropics", Contract n. FP6-2002- INCO-DEV-1 SEEDSOURCE.

2006-2008 Partner in the project "OLICANTO - Olio di Canapa Toscano" contract between A.R.S.I.A Regione Toscana and Legambiente Toscana Onlus.

2006-2010 Participant in the project of European Commission "Evolution of trees as drivers of terrestrial biodiversity", Contract n. GOCE n. 016322 - EVOLTREE.

2007-2010 Participant in the project "Incremento della quantità e della qualità di pine e pinoli in pino domestico. Strategie di conservazione ed impiego di materiale migliorato ", supported by the Italian *Ministry* of Agricultural, Food and Forestry Policies

2008 Scientific *Responsible* of the project "B.O. 2007 - Sviluppo di prodotti innovativi da matrici floreali L.R. 32/99 art. 4", Contract between Azienda Regionale Veneto Agricoltura and IGV-CNR

2008 Scientific *Responsible* of the project "B.O. 2007 - Prodotti innovativi da matrici provenienti dalla Rosa di S. Antonio ", Contract between Azienda Regionale Veneto Agricoltura and IGV-CNR

2008-2009 Coordinator of the project "MELASUK - Utilizzo della varietà locale "Mela Rotella" per la produzione di succhi di frutta " contract between A.R.S.I.A Regione Toscana and IGV-CNR.

2008-2012 Coordinator of the project "OLIROTO - Olio essenziale di rosmarino toscano " contract between A.R.S.I.A Regione Toscana and IGV-CNR.

2012-2015 Participant in the project European Commission - 7 FP KBBE Programme: WATBIO Development of improved perennial non-food biomass and bioproduct crops for water stressed environments

2012-2015 Participant in the project "Assessing the impacts of invasive fungal pathogens and phytophagous insects on native plants, pathogens, phytophagous insects and symbionts " supported by the Ministry of Education, Universities and Research

### Memberships to scientific societies

- Societa' Italiana di Selvicoltura ed Ecologia Forestale (SISEF).

### Publications of the last 5 years: 2022 -2018)

#### **2022**

Menicucci, F., Palagano, E., Michelozzi, M., Cencetti, G., Raio, A., Bacchi, A., Mazzeo, P.P., Cuzman, O. A., Sidoti, A., Guarino, S., Basile, S., Riccobono, O., Peri, E., Vizza, F., Ienco, A. (2022). Effects of trapped-into-solids volatile organic compounds on paper biodeteriogens. *International Biodeterioration & Biodegradation* 174, 105469

Marini L, Palchetti E, Brilli L, Fico G, Giuliani C, Michelozzi M, Cencetti G, Foggi B, Bruschi P. (2022). Terpene Profiles Composition and Micromorphological Analysis on Two Wild Populations of *Helichrysum* spp. from the Tuscan Archipelago (Central Italy). *Plants*. 11(13):1719. <https://doi.org/10.3390/plants11131719>

Finetti L, Civolani S, Mirandola D, Benetti L, Francati S, Albanese F, Menicucci F, Michelozzi M, Bellardi MG, Dindo ML, Bernacchia G. (2022). *Monarda didyma* Hydrolate Affects the Survival and the Behaviour of *Drosophila suzukii*. *Insects*. 2022; 13(3):280. <https://doi.org/10.3390/insects13030280>

Menicucci, F. Palagano, E., Raio, A., Cencetti, G. Nicola Luchi, N., Ienco, A., Michelozzi, M. (2022). Plant Sampling for Production of Essential Oil and Evaluation of Its Antimicrobial Activity In Vitro. In: Luchi, N. (eds) Plant Pathology. Methods in Molecular Biology, vol 2536. Humana, New York, NY. [https://doi.org/10.1007/978-1-0716-2517-0\\_28](https://doi.org/10.1007/978-1-0716-2517-0_28)

#### **2021**

Dani, K.G.S., Fineschi, S., Michelozzi, M., Trivellini, A., Pollastri, S., Loreto F. (2021). Diversification of petal monoterpene profiles during floral development and senescence in wild roses: relationships among geraniol content, petal colour, and floral lifespan. *Oecologia* 197, 957–969 (2021). <https://doi.org/10.1007/s00442-020-04710-z>

Spadi, A., Angeloni, G., Guerrini, L., Corti, F., Michelozzi, M., Cencetti, G., Parenti, A., & Masella, P. (2021). Using a Plackett-Burman design to maximise yield of rosemary essential oil by distillation. *Industrial Crops and Products*, 166, 113488.

Cascone, P.; Quarto, R.; Iodice, L.; Cencetti, G.; Formisano, G.; Spiezia, G.; Giorgini, M.; Michelozzi, M.; Guerrieri, E. (2021). Behavioural response of the main vector of *Xylella fastidiosa* towards olive VOCs. *Entomologia Generalis*. doi = "10.1127/entomologia/2021/1218"

Ugolini, F., Crisci, A., Albanese, L., Cencetti, G., Maienza, A., Michelozzi, M., Zabini, F. and Meneguzzo, F., (2021). Effects of Silver Fir (*Abies alba* Mill.) Needle Extract Produced via Hydrodynamic Cavitation on Seed Germination. *Plants*, 10(7), p.1399.

Guarino, S., Abbate, L., Mercati, F., Fatta Del Bosco, S., Motisi, A., Arif, M.A., Cencetti, G., Palagano, E. and Michelozzi, M., (2021). Citrus Varieties with Different Tolerance Grades to Tristeza Virus Show Dissimilar Volatile Terpene Profiles. *Agronomy*, 11(6), p.1120.

Menicucci, F., Michelozzi, M., Raio, A., Tredici, M., Cencetti, G., Clemente, I. and Ristori, S., (2021). Thymol-loaded lipid nanovectors from the marine microalga *Nannochloropsis* sp. as potential antibacterial agents. *Biocatalysis and Agricultural Biotechnology*, 32, p.101962.

Bellumori, M., Innocenti, M., Congiu, F., Cencetti, G., Raio, A., Menicucci, F., Mulinacci, N. and Michelozzi, M., (2021). Within-Plant Variation in *Rosmarinus officinalis* L. Terpenes and Phenols and Their Antimicrobial Activity against the Rosemary Phytopathogens *Alternaria alternata* and *Pseudomonas viridiflava*. *Molecules*, 26(11), p.3425.

#### **2020**

Brilli, F., Luchi, N., Michelozzi, M., Calamai, L., Cencetti, G., Pecori, F., Nigrone, E. and Santini, A., (2020). Volatile organic compounds (VOC) as biomarkers for detection of *Ceratocystis platani*. *Forest Pathology*, 50(4), p.e12618.

Dani, K.S., Fineschi, S., Michelozzi, M., Trivellini, A., Pollastri, S. and Loreto, F., (2020). Diversification of petal monoterpene profiles during floral development and senescence in wild roses: Relationships among geraniol content, petal colour, and floral lifespan. *Oecologia*, pp.1-13.

Bustamante, M.Á., Michelozzi, M., Barra Caracciolo, A., Grenni, P., Verbokkem, J., Geerdink, P., Safi, C. and Nogues, I., (2020). Effects of soil fertilization on terpenoids and other carbon-based secondary metabolites in *rosmarinus officinalis* plants: A comparative study. *Plants*, 9(7), p.830.

Della Rocca, G., Danti, R., Hernando, C., Guijarro, M., Michelozzi, M., Carrillo, C. and Madrigal, J., (2020). Terpene accumulation links plant health and flammability in the cypress-bark canker pathosystem. *Forests*, 11(6), p.651.

Dani, K. S., Torzillo, G., Michelozzi, M., Baraldi, R., & Loreto, F. (2020). Isoprene emission in darkness by a facultative heterotrophic green alga. *Frontiers in plant science*, 11.

## **2019**

Mazzeo, P.P., Carraro, C., Monica, A., Capucci, D., Pelagatti, P., Bianchi, F., Agazzi, S., Careri, M., Raio, A., Carta, M. and Menicucci, F., (2019). Designing a palette of cocrystals based on essential oil constituents for agricultural applications. *ACS Sustainable Chemistry & Engineering*, 7(21), pp.17929-17940.

Podda, A., Pollastri, S., Bartolini, P., Pisuttu, C., Pellegrini, E., Nali, C., Cencetti, G., Michelozzi, M., Frassinetti, S., Giorgetti, L. and Fineschi, S., (2019). Drought stress modulates secondary metabolites in *Brassica oleracea* L. convar. *acephala* (DC) Alef, var. *sabellica* L. *Journal of the Science of Food and Agriculture*, 99(12), pp.5533-5540.

Di Vito, Maura; Bellardi, Maria Grazia; Mondello, Francesca; Modesto, Monica; Michelozzi, Marco; Bugli, Francesca; Sanguinetti, Maurizio; Sclocchi, Maria Carla; Sebastiani, Maria Letizia; Biffi, Sauro. ((2019)). *Monarda citriodora* hydrolate vs essential oil comparison in several anti-microbial applications. *Industrial Crops and Products*, 128, 206-212.

Gontijo, L., Cascone, P., Giorgini, M., Michelozzi, M., Rodrigues, H.S., Spiezia, G., Iodice, L. and Guerrieri, E., (2019). Relative importance of host and plant semiochemicals in the foraging behavior of *Trichogramma achaeae*, an egg parasitoid of *Tuta absoluta*. *Journal of Pest Science*, 92(4), pp.1479-1488. Pollastri, S., Jorba, I., Hawkins, T.J., Llusà, J., Michelozzi, M., Navajas, D., Peñuelas, J., Hussey, P.J., Knight, M.R. and Loreto, F., (2019). Leaves of isoprene-emitting tobacco plants maintain PSII stability at high temperatures. *New Phytologist*, 223(3), pp.1307-1318.

Vezzola, L.C., Michelozzi, M., Calamai, L., Gonthier, P., Giordano, L., Cherubini, P. and Pelfini, M., (2019). Tree-ring volatile terpenes show potential to indicate fungal infection in asymptomatic mature Norway spruce trees in the Alps. *Forestry: An International Journal of Forest Research*, 92(2), pp.149-156.

## **2018**

Pollastri, S., Savvides, A., Pesando, M., Lumini, E., Volpe, M. G., Ozudogru, E. A., Faccio, A., De Cunzio, F., Michelozzi, M., Lambardi, M., (2018). Impact of two arbuscular mycorrhizal fungi on *Arundo donax* L. response to salt stress. *Planta*, 247, 3, 573-585.

Madmony, A., Tognetti, R., Zamponi, L., Capretti, P., Michelozzi, M., (2018). Monoterpene responses to interacting effects of drought stress and infection by the fungus *Heterobasidion parviporum* in two clones of Norway spruce (*Picea abies*). *Environmental and Experimental Botany*, 152, 137-148.

Di Vito, M., Bellardi, M. G., Colaizzi, P., Ruggiero, D., Mazzuca, C., Micheli, L., Sotgiu, S., Iannuccelli, S., Michelozzi, M., Mondello, F., (2018). Hydrolates and Gellan: An Eco-innovative Synergy for Safe Cleaning of Paper Artworks. *Studies in Conservation*, 63, 1, 13-23.

Pepori, A. L., Michelozzi, M., Santini, A., Cencetti, G., Bonello, P., Gonthier, P., Sebastiani, F., Luchi, N., (2018). Comparative transcriptional and metabolic responses of *Pinus pinea* to a native and a non-native *Heterobasidion* species. *Tree physiology*, 39, 1, 31-44.

Lista Pubblicazioni completa disponibile su [CNR People](#)

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