



BRIZZOLARA STEFANO

Date of birth:
09/08/1986

EDUCATION

- Sep. 2005 - Sep. 2009 (Title acquisition date: 25/09/2009)
Bachelor's degree - Biotechnology
Experimental thesis: *Molecular characterization of primary cultures of pleuric mesotheliomas*
Supervisors: Prof. Giorgio Corte, Prof. Antonio Daga
Interfaculty of Biotechnology, University of Genoa, Italy
Final mark: 104/110
- Sep. 2009 - Dec. 2011 (Title acquisition date: 12/12/2011)
Master's degree - Plant and Microbial Biotechnology
Experimental thesis: *Molecular association between Trichoderma virens and plant in different systems*
Supervisors: Prof. Mariarosaria Vergara, Prof. Lorenzo Guglielminetti
Agricultural Faculty, University of Pisa, Italy
Final mark: 110/110 cum laude
- Jan. 2013 - July 2017 (Title acquisition date: 12/07/2017)
PhD - Agrobiosciences
Project: *Metabolomics and postharvest stress physiology in fleshy fruits*
Supervisor: Prof. Pietro Tonutti
Institute of Life sciences, Scuola Superiore Sant'Anna, Pisa, Italy
PhD Thesis summary:
Metabolomics has been successfully applied to unravel some physiological processes affected in peaches by refrigeration and in apples by Controlled Atmosphere (CA) storage: by means of an integrated analytical and statistical approach both common and divergent response mechanisms have been identified in different cultivars, and some cv-specific strategies, induced to cope with and respond to the applied postharvest stresses, have been successfully detected.

TRAINING

- June 2011 - Aug. 2011
Extension of "In vitro Cultures and Secondary Metabolites" laboratory
Project: Micropropagation and production of callus from *Ocimum basilicum Purpurascens* and *Iris*
Acquired skills: technical skills in plant tissue micropropagation
Supervisor: Prof.ssa Anna Mensuali
Department of Horticulture, University of Pisa, Italy
- Jan. 2011 - Sept. 2012
Research Stage on "The molecular basis of plant-host interaction"
Project: Molecular characterization of three *Trichoderma virens* isolates transformed for inactivation of an endopolygalacturonase gene
Acquired skills: technical skills in molecular analysis and mycelium transformation.
Supervisor: Prof. Giovanni Vannacci
Department of Tree Science, Entomology and Plant Pathology, University of Pisa, Italy
- Dec. 2014 - Aug. 2015
Internship - Belgium
Project: Changes in VOCs (Volatile Organic Compounds) and metabolic profiles under stress conditions during fruit storage
Acquired skills: technical skills in GC-MS/LC-MS/MS metabolomic analysis, experimental designing and data analysis with specific statistical tools.
Supervisors: Prof. Bart Nicolai, Dr. Maarten Hertog, Prof. Pietro Tonutti
BIOSYST-MeBioS (Division of Mechatronics, Biostatistics and Sensors), Katholieke Universiteit Leuven, Belgium
- June 2017 - July 2017
Internship - France
Project: Ripening and hypoxia related genes analysis via quantitative real-time PCR in transgenic tomato fruits (*amiATE*) of different ripening stages
Acquired skills: technical skills in molecular and bioinformatic analyses.
Supervisors: Prof. Julien Pirrello, Prof. Pietro Tonutti
Genomics and Biotechnology of Fruit (GBF) laboratory, Institut national de la recherche agronomique (INRA), Tolosa, Francia
- Jan. 2020 - May 2020
Mass Spectrometry Course
Supervisor: Dr. Andrea Raffaelli
Institute of Life sciences, Scuola Superiore Sant'Anna, Pisa, Italy

WORKING EXPERIENCE

- July 2016 - Dec. 2019

Postdoctoral fellow

Research topics: *Fruit physiology (metabolomic, transcriptomic, hormonal profiling); Plant abiotic stress response (cold and hypoxia stresses); Fruit and vegetable postharvest disorders; Pre- and postharvest treatments (low temperature, ozone, canopy management, artificial pollination) for improving/maintaining crop quality and yield; Optimization of storage technologies and food processing protocols.*

Acquired skills: improved technical skills in research project writing and coordination, metabolomic and transcriptomic analysis, field experiment design and grape and wine biochemical analysis, data analysis.

Institute of Life sciences, Scuola Superiore Sant'Anna, Pisa, Italy

- Jan. 2020 – Jan. 2023

Technologist

Additional research topics: *Metabolome-volatilome interactions; Micro-sensor (MetalOxide, NIR, UV) applications for monitoring plant stress in-vivo and food processing procedure; Innovative ethylene scavenging.*

Acquired skills: specific technical skills in monitoring of plant in-vivo employing E-nose and micro-sensors, micro-sensors application for monitoring food processing procedure, LC-MS/MS, MP-AES and atomic absorption spectroscopy methods construction and optimization.

Crop research center, Scuola Superiore Sant'Anna, Pisa, Italy

- Feb. 2023 – Current position

Researcher

Crop Research Center, Scuola Superiore Sant'Anna, Pisa, Italy

PUBLICATIONS

SCOPUS indexed:

- Santin, M., Brizzolara, S., Castagna, A., Ranieri, A., & Tonutti, P. (2022). **Short-Term CO₂ Treatment of Harvested Grapes (*Vitis vinifera* L., cv. Trebbiano) before Partial Dehydration Affects Berry Secondary Metabolism and the Aromatic Profile of the Resulting Wine.** *Plants*, 11(15), 1973.
- Tonutti, P., Bonghi, C., & Brizzolara, S. (2021). **Multimomics approaches for the improvements of postharvest systems.** In *Postharvest Handling* (pp. 251-276). Academic Press.
- Modesti, M., Shmulevitz, R., Macaluso, M., Bianchi, A., Venturi, F., Brizzolara, S., Zinnai, A., Tonutti, P. (2021). **Pre-processing cooling of harvested grapes induces changes in berry composition and metabolism, and affects quality and aroma traits of the resulting wine.** *Frontiers in nutrition*, 8.
- Sanmartin, C., Modesti, M., Venturi, F., Brizzolara, S., Mencarelli, F., & Bellincontro, A. (2021). **Postharvest Water Loss of Wine Grape: When, What and Why.** *Metabolites*, 11(5), 318.
- Dourou, A. M., Brizzolara, S., Famiani, F., and Tonutti, P. (2021). **Changes in volatile organic composition of olive oil extracted from cv 'Leccino' fruit subjected to ethylene treatments at different ripening stages.** *Journal of the Science of Food and Agriculture*, 101(9), 3981-3986.
- Brizzolara, S., Modesti, M., Rong, X., and Tonutti, P. (2020). **Volatile compound and gene expression profiles associated with the storage of two peach fruit genotypes differently sensitive to chilling injuries.** *Advances in Horticultural Science*, 34.
- Brizzolara, S., Minnocci, A., Yembaturova, E., and Tonutti, P. (2020). **Ultrastructural analysis of berry skin from four grapes varieties at harvest and in relation to postharvest dehydration.** *OENO One*, 54(4), 1021-1031.
- Modesti M., Shmulevitz R., Brizzolara S. and Tonutti P. (2020). **Short-term low temperature treatment of harvested wine grapes (cv Vermentino) affects the volatile organic compound profile of the berries.** *Advances in Horticultural Science*, 34(15), 27-33.
- Brizzolara, S., Watkins, C.B., Manganaris, G.A., Vassilis, F and Tonutti, P. (2020). **Primary metabolism in fresh fruits during storage.** *Frontiers in Plant Science*, 11.
- Dourou, A.M., Brizzolara, S., Meoni, G. Tenori, L., Famiani, F., Luchinat, C., and Tonutti, P (2020). **The inner temperature of the olives prior to processing affects the volatile profile and the composition of the oil.** *Food Research International*, 129,108861.
- Catini, A., Papale, L., Capuano, R., Pasqualetti, V., Di Giuseppe, D., Brizzolara, S., Tonutti, P., and Di Natale, C. (2019). **Development of a sensor node for remote monitoring of plants.** *Sensors*, 19(22), 4865.
- Brizzolara, S., Cukrov, D., Mercadini, M., Martinelli, F., Ruperti, B., and Tonutti, P. (2019). **Short-term responses of apple fruit to partial re-oxygenation during extreme hypoxic storage conditions.** *Journal of agricultural and food chemistry*, 67(17), 4754-4763.
- Dourou, A. M., Brizzolara, S., Famiani, F., and Tonutti, P. (2019). **Effects of pre-processing low temperature conditioning of olives on volatile organic compound (VOC) profiles of fruit paste and oil.** In *VI International Conference Postharvest Unlimited 1256* (pp. 53-58).
- Cukrov D., Brizzolara S., and Tonutti P. (2018). **Physiological and Biochemical Effects of Controlled and Modified Atmospheres.** In: E. Yhaia e A.C. Lopez (eds.) *Postharvest Physiology and Biochemistry of Fruits and Vegetables.* Woodhead Publishing. Pag: 425-442.
- Brizzolara, S., & Tonutti, P. (2019). **The effect of cold storage on volatile organic compounds (VOCs) emitted from intact peach fruit.** In *VI International Conference Postharvest Unlimited 1256* (pp. 151-156).
- Brizzolara, S., Hertog, M., Tosetti, R., Nicolai, B., and Tonutti, P. (2018). **Metabolic responses to low temperature of three peach fruit cultivars differently sensitive to cold storage.** *Frontiers in Plant Science*, 9.
- Brizzolara, S., Santucci, C., Tenori, L., Hertog, M., Nicolai, B., Stürz, S., Zanella, A., and Tonutti, P. (2017). **A metabolomics approach to elucidate apple fruit responses to static and dynamic controlled atmosphere storage.** *Postharvest Biology and Technology*, 127, 76-87.
- Cukrov, D., Zermiani, M., Brizzolara, S., Cestaro, A., Licausi, F., Luchinat, C., Santucci, S., Tenori, L., Van Veen, H., Zuccolo, A., Ruperti, B., and Tonutti, P. (2016). **Extreme hypoxic conditions induce selective molecular responses and metabolic reset in detached apple fruit.** *Frontiers in plant science*, 7, 146.
- Santucci, C., Brizzolara, S., & Tenori, L. (2015). **Comparison of frozen and fresh apple pulp for NMR-based metabolomic analysis.** *Food analytical methods*, 8(8), 2135-2140.
- Cukrov, D., Brizzolara, S., & Tonutti, P. (2015). **Molecular and metabolic responses of fruits to low oxygen postharvest stress.** *Acta Horticulturae* 1071, pp. 37-43.

SCOPUS indexed - In press:

- Modesti, M., Brizzolara, S., Baccelloni, S., Forniti, R., Ceccantoni, B., Bellincontro, A., Catelli, C., Mencarelli, F., Tonutti, P. (2022). **Post-harvest ozone fumigation of grapes (cv Sangiovese) differently affects volatile organic compound and polyphenol profiles of berries and wine.** *In press Australian Journal of Grape and Wine Research.*
- Vendrell Calatayud, M., Brizzolara, S., Meoni, G., Tenori, L., Luchinat, C., Tonutti, P. (2022). **Effects of pre-processing cooling treatments of harvested olives on oil volatilome and quality parameters.** *In Press Acta Horticulturae.*

Non-Indexed:

- Brizzolara, S., Tenori, L., & Korban, S. S. (2021). **Metabolomic Approaches for Apple Fruit Quality Improvement.** In *The Apple Genome* (pp. 311-339). Springer, Cham.
- Modesti, M., Brizzolara, S., Shmulevitz, R., Bezzo, G., Eberle, D., and Tonutti, P. (2020). **Terpenoid profiles and Biosynthetic gene expression pattern in Asti DOCG White Muscat grapes at ripening as affected by different canopy management protocols.** *XIIIth International Terroir Congress proceedings.*
- Modesti, M., Baccelloni, S., Brizzolara, S., Aleandri, M.P., Bellincontro, A., Mencarelli, F., and Tonutti, P. (2019). **Effects of treatments with ozonated water in the vineyard (cv Vermentino) on microbial population growth and fruit quality parameters.** In *BIO Web of Conferences* (Vol. 13, p. 04011). EDP Sciences.
- Vergara, M., Sarrocco, S., Brizzolara, S., Seiboth, B., Seidl-Seiboth, V., & Vannacci, G. (2012). **Characterization of a mutant knocked out for a polygalacturonase gene in *Trichoderma virens*.** *Journal of Plant Pathology*, 94(4).

SCIENTIFIC CONFERENCES

Oral communications - Presenter

- Dourou A.M., Meoni G., Tenori L., Luchinat C., Tonutti P., Brizzolara S. (2022). **Un approccio multi-omico per lo studio dei meccanismi fisiologici coinvolti nella cascola post-allegagione dei frutti di olivo.** Oral presentation, *V Convegno Nazionale dell'Olivo e dell'Olio, Alghero, Italy.*
- Brizzolara, S., Luminare, A.G., Florida, G., Gambineri, F., Tonutti, P. (2022). **Evolution of the aroma profile during winemaking: optimization of the fermentation process by monitoring the headspace through MOx micro-sensors.** Oral presentation, *INNOVABILE - Fabbrica del cibo 4.0 per filiere a scarti zero, Pisa, Italy.*
- Brizzolara S., Tonutti, P. (2021). **Effetti del trattamento a bassa temperatura di uve da vino e olive in postraccolta/pre-processing sulla qualità del vino e dell'olio.** Oral presentation, *Cantiere del cibo 2021, Pisa, Italy.*
- Brizzolara, S., Cainelli, N., Ruperti B., Tonutti, P. (2019). **Differential molecular responses of apple skin and pulp to low oxygen fluctuations during storage.** Oral presentation, *MODEL-IT 2019, Molfetta, Italy.*
- Brizzolara, S., Baccelloni, S., Modesti, M., Aleandri, M.P., Bellincontro, A., Mencarelli, F., and Tonutti, P. (2018). **Trattamento con ozono in vigneto e su uve in pre-vinificazione: effetti sul controllo di malattie fungine e su parametri qualitativi delle uve.** Oral presentation, *7° Convegno Nazionale di Viticoltura (CONAVI) 2018, Piacenza, Italy.*
- Brizzolara, S., Hertog, M., Tosetti, R., Nicolai, B., and Tonutti, P. (2017). **Metabolic responses to low temperature of three peach fruit cultivars differently sensitive to cold storage.** Oral presentation, *VI Postharvest Unlimited, Madrid, Spain.*
- Brizzolara, S., Hertog, M., Nicolai, B., and Tonutti, P. (2017). **Un approccio metabolomico integrato per lo studio della frigo-conservazione in frutti di pesco.** Oral presentation, *Workshop Nazionale Gruppo di Lavoro Postraccolta SOI, Pisa, Italy.*
- Brizzolara, S., Santucci, C., Zanella, A., Stürz, S., and Tonutti, P. (2016). **Comparing dynamic and static controlled atmosphere storage: 'Granny Smith' vs 'Red Delicious' apple cultivar, a metabolomic approach.** Oral presentation, *VIII International Postharvest Symposium Cartagena, Cartagena, Spain.*
- Brizzolara, S., Hertog, M., Nicolai, B., and Tonutti, P. (2016). **Alterazioni metaboliche indotte dalla frigo-conservazione in frutti di pesco: un approccio di tipo metabolomico.** Oral presentation, *XI Giornate scientifiche SOI, Bolzano, Italy.*
- Brizzolara, S., Santucci, C., Tenori, L., Zanella, A., Stürz, S., Hertog, M., Nicolai, B., and Tonutti, P. (2016). **Conservazione dinamica e statica di frutti di melo in atmosfera controllata: 'Granny Smith' vs 'Red Delicious' cultivar, un approccio metabolomico.** Oral presentation, *XI Giornate scientifiche SOI, Bolzano, Italy.*
- Brizzolara, S., Cukrov, D., Santucci, C., Tenori, L., and Tonutti, P. (2014). **Changes in the metabolic profile of the fruit in response to abiotic stress during post-harvest storage.** Oral presentation, *CHIMALI - X Congresso italiano di chimica degli alimenti, Firenze, Italy.*

Oral and Poster communications - Co-author

- Calatayud M.V., Meoni G., Tenori L., Luchinat C., Tonutti P., Brizzolara S. (2022). **Effetto della rapida refrigerazione delle olive in pre-frangitura sulla qualità e il profilo aromatico dell'olivo.** Poster presentation, *V Convegno Nazionale dell'Olivo e dell'Olio, Alghero, Italy.*
- Salamè, E., Brizzolara, S., Rodrigues, M., Ruperti, B., Tonutti, P. (2022). **Dissecting the physiological effects of postharvest hypoxic stress on 'Stark delicious' apples.** Oral presentation, *8° Convegno Nazionale Postraccolta Pesca, Pistoia, Italy.*

- Shiriaev, A., Brizzolara, S., Pezzarossa, B., Tonutti, P. (2022). **Se-biofortified tomato plants: a nutraceutical perspective under MS disclosure**. Poster presentation, *IMass Giovani e spettrometria dimassa, Torino, Italy*.
- Modesti, M., Brizzolara, S., Forniti, R., Ceccantoni, B., Catelli, C., Mencarelli, F., Bellincontro, A., Tonutti, P. (2022). **Effect of post-harvest ozone treatment on secondary metabolites biosynthesis and accumulation in grapes and wine**. Poster presentation, *Wine active compounds conference, Dijon, France*.
- Modesti, M., Brizzolara, S., Catelli, C., Mencarelli, F., Bellincontro, A., Tonutti, P. (2022). **Vineyard ozone application to induce secondary metabolites accumulation in grapes and wine**. Poster presentation, *Wine active compounds conference, Dijon, France*.
- Cainelli, N., Salame, E., Modesti, M., Brizzolara, S., Ruperti, B., Tonutti, P. (2021). **The expression pattern of primary metabolism key-genes is differentially affected in the apple cortex following the oxygen concentration shift applied in DCA storage protocols**. Oral presentation, *XIII International Controlled and Modified Atmosphere Research Conference - CaMa2021, Leuven, Belgium*.
- Vendrell, C.M., Dourou, A.M., Brizzolara, S., Meoni, G., Tenori, L., Luchinat, C., Tonutti, P. (2022). **Effects of pre-processing cooling treatments of harvested olives (Cv Leccio del Corno) on oil quality and volatile profile**. Oral presentation, *International Horticultural Congress (IHC), Angers, France*.
- Vendrell, C.M., Dourou, A.M., Brizzolara, S., Meoni, G., Tenori, L., Luchinat, C., Tonutti, P. (2021). **Effects of pre-processing cooling treatments of harvested olives (Cvs Frantoio and Leccino) on oil quality and volatile profile**. Oral presentation, *XIII Giornate Scientifiche SOI, Catania, Italy*.
- Vendrell, C.M., Dourou, A.M., Brizzolara, S., Meoni, G., Tenori, L., Luchinat, C., Tonutti, P. (2021). **Effects of pre-processing cooling treatments of harvested olives (Cvs Frantoio and Leccino) on oil quality and volatile profile**. Oral presentation, *Expoliva: XX International fair of the olive oil and allied industries, Jaen, Spain*.
- Dourou, A.M., Meoni, G., Luedtke, S., Brizzolara, S., Tenori, L., Luchinat, C., Muñoz, P., Mun-Né-Bosh, S., Patterson, S., and Tonutti, P. (2018). **Unravelling fruitlet drop in Olea Europea (Cv. Frantoio)**. Oral presentation, *OLIVEBIOTEQ'18, Sevilla, Spain*.
- Dourou, A.M., Brizzolara, S., Famiani, F., and Tonutti, P. (2018). **Genotype-dependent responses in the oil composition of harvested olives treated with exogenous ethylene**. Poster presentation, *OLIVEBIOTEQ'18, Sevilla, Spain*.
- Dourou, A.M., Brizzolara, S., Famiani, F., and Tonutti, P. (2018). **Effects of post-harvest low temperature conditioning of olive fruit on oil aroma profiling**. Poster presentation, *OLIVEBIOTEQ'18, Sevilla, Spain*.
- Dourou, A.M., Brizzolara, S., Famiani, F., and Tonutti, P. (2018). **Genotype-dependent responses in the oil composition of harvested olives treated with exogenous ethylene**. Poster presentation, *The XI International Symposium on the Plant Hormone Ethylene, Chania, Crete, Greece*.
- Dourou, A.M., Brizzolara, S., Famiani, F., and Tonutti, P. (2017). **Effects of post-harvest low temperature conditioning of olive fruit on oil aroma profiling**. Poster presentation, *Workshop Nazionale Gruppo di Lavoro Postraccolta SOI, Pisa, Italy*.
- Dourou, A.M., Brizzolara, S., Meoni, G., Tenori, L., Luchinat, C., and Tonutti, P. (2017). **Olive fruitlet drop: Metabolic and Hormonal Implications**. Oral presentation, *IV Convegno Nazionale dell'Olio e dell'Olio, Pisa, Italy*.
- Brizzolara, S., and Tonutti, P. (2014). **Changes in volatile organic compound (VOC) profiling of peaches stored at different low temperatures**. Poster presentation, *V Postharvest Unlimited, Lemesos, Cyprus*.
- Brizzolara, S., Cukrov, D., Santucci, C., Tenori, L., and Tonutti, P., (2014). **Cambiamenti del profilo metabolico dei frutti in risposta a stress abiotici in post-raccolta**. Poster presentation, *Postraccolta 2014 - Reducing postharvest losses to better feed the world, Barletta, Italy*.
- Cukrov, D., Brizzolara, S., Begheldo, M., Zemiani, M., Ruperti, B., and Tonutti, P. (2014). **Caratterizzazione molecolare della risposta di frutti di melo a condizioni ipossiche tipiche della Atmosfera Controllata Dinamica (DCA)**. Poster presentation, *Postraccolta 2014 - Reducing postharvest losses to better feed the world, Barletta, Italy*.
- Cukrov, D., Brizzolara, S., Licausi, F., and Tonutti, P. (2014). **Molecular characterization of fleshy fruit responses to low oxygen**. Poster presentation, *Plant biology Europe FESPB/EPSO 2014, Dublin, Ireland*.