

University Academic Curriculum Vitae **Raphael Tiziani**

Personal information Name: **Raphael Tiziani**
 Date of birth: **13.11.1992**
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Education since leaving school

- 2015 **Bachelor's** degree in “Agricultural and Environmental Sciences”, Free University of Bolzano, Italy (107/110)
- 2017 **Master's** degree in “Agri-Food Biotechnology”, University of Verona, Italy (110/110)
- 2021 **Ph.D.** in “Food Engineering and Biotechnology”, Faculty of Science and Technology, Free University of Bolzano, Italy
- 2025 **Habilitation** as associate professor for the disciplinary field of 07/E1 - Agricultural chemistry, agricultural genetics and pedology

Present appointment

- Title of appointment: Junior Researcher (“*Ricercatore junior a tempo determinato RTDa*”)
- Start of appointment: October 2024
- Level of appointment: Free University of Bolzano, Faculty of Agricultural, Environmental and Food Sciences
- Responsibilities: Root exudates sampling and research, rhizosphere sampling and research, rhizobox growing systems, soilless growing systems, diffusive gradient in thin films (DGT) development, chemical and physical soil analysis, ¹³C research, carbon cycle, soil ecology, microplastic contamination research, metabolomics, field experiments, soil sampling in agricultural sites, science dissemination, policy engagement, science policy interaction.

Professional experience Chronological list of all previous employments (each with job title, starting and finishing dates, level, employer, responsibilities):

From / to	Job title	Name of academic Institution	Academic level	responsibilities
11.2017 to 12.2020	Ph.D-student	Free University of Bolzano	Master Degree	Root exudates research, rhizosphere sampling and research, soilless growing systems, DGT development, chemical-physical soil analysis, RT-qPCR, ¹³ C fractionation, targeted and untargeted metabolomics
03.2019 to 10.2019	Visiting Ph.D student within Ph.D. course	BOKU- University of Natural resources and Life Sciences, Department of Crop Sciences, Institute of Agronomy	Master Degree	DGT method development, root exudates sampling and analysis, rhizobox growing system, targeted metabolomics
01.2021 to 06.2022	Research assistant	Free University of Bolzano	PhD	Root exudates sampling and research, rhizosphere sampling and research, rhizobox growing systems, soilless growing

				systems, DGT development, chemical physical soil analysis, ¹³ C research, targeted metabolomics
07.2022 to 10.2024	Research assistant	Free University of Bolzano	PhD	Root exudates sampling and research, rhizosphere sampling and research, rhizobox growing systems, soilless growing systems, DGT development, chemical physical soil analysis, ¹³ C research, C cycle, soil ecology, microplastic contamination, soil targeted metabolomics, citizen science, field experiments, soil sampling in agricultural sites
10.2024 to present	Junior Researcher (RTDa)	Free University of Bolzano	PhD	Root exudates sampling and research, rhizosphere sampling and research, rhizobox growing systems, soilless growing systems, diffusive gradient in thin films (DGT) development, chemical and physical soil analysis, ¹³ C research, carbon cycle, soil ecology, microplastic contamination, metabolomics, field experiments, soil sampling in agricultural sites, science dissemination, policy engagement, science policy interaction.

Experience in academic teaching

- **AY 2025/2026 Lecturer** (60 hours, teaching language: German) of Analytical Chemistry (6 ECTS) at the Free University of Bolzano in the Bachelor for Agricultural, Food and Mountain Environmental Sciences (L-25); academic level: PhD, *no evaluation yet*
- **AY 2025/2026 Lecturer** (30 hours, teaching language: German) of "Labor für Holzchemie (Laboratory for Wood Chemistry)" (3 ECTS) at the Free University of Bolzano in the Bachelor in Wood Technology (L-P03); academic level: PhD, **Evaluation 9.5/10**

- AY **2025/2026 Lecturer** (30 hours, teaching language: German) of “Holzchemie (Wood Chemistry) (3 ECTS) at the Free University of Bolzano in the Bachelor in Wood Technology (L-P03); academic level: PhD, **Evaluation 9.5/10**
- AY **2024/2025 Lecturer** (60 hours, teaching language: German) of Analytical Chemistry (6 ECTS) at the Free University of Bolzano in the Bachelor for Agricultural, Food and Mountain Environmental Sciences (L-25); academic level: PhD, **Evaluation 9.5/10**
- AY **2024/2025 Lecturer** (30 hours, teaching language: German) of “Labor für Holzchemie (Laboratory for Wood Chemistry)” (3 ECTS) at the Free University of Bolzano in the Bachelor in Wood Technology (L-P03); academic level: PhD, **Evaluation 9.5/10**
- AY **2024/2025 Lecturer** (30 hours, teaching language: German) of “Holzchemie (Wood Chemistry) (3 ECTS) at the Free University of Bolzano in the Bachelor in Wood Technology (L-P03); academic level: PhD, **Evaluation 9.5/10**
- AY **2023/2024 Lecturer** (60 hours, teaching language: German) of Analytical Chemistry (6 ECTS) at the Free University of Bolzano in the Bachelor for Agricultural, Food and Mountain Environmental Sciences (L-25); academic level: PhD, **Evaluation 9.3/10**
- AY **2022/2023 Teaching assistant** (8 hours, teaching language: German) of Analytical Chemistry (6 ECTS) held by Prof. Tanja Mimmo at the Free University of Bolzano in the Bachelor for Agricultural, Food and Mountain Environmental Sciences (L-25), PhD, *no evaluation available*
- AY **2022/2023 Teaching assistant** (52 hours, teaching language: German) of Soil chemistry and fertility (6 ECTS) held by Prof. Tanja Mimmo at the Free University of Bolzano in the Bachelor for Agricultural, Food and Mountain Environmental Sciences, academic level: PhD, *no evaluation available*
- AY **2021/2022 Teaching assistant** (8 hours, teaching language: German) of Analytical Chemistry (6 ECTS) held by Prof. Tanja Mimmo at the Free University of Bolzano in the Bachelor for Agricultural, Food and Mountain Environmental Sciences, academic level: PhD, *no evaluation available*
- AY **2021/2022 Teaching assistant** (52 hours, teaching language: German) of Soil chemistry and fertility (6 ECTS) held by Prof. Tanja Mimmo at the Free University of Bolzano in the Bachelor for Agricultural, Food and Mountain Environmental Sciences, academic level: PhD, *no evaluation available*
- AY **2020/2021 Teaching assistant** (52 hours, teaching language: German) of Soil chemistry and fertility (6 ECTS) held by Prof. Tanja Mimmo at the Free University of Bolzano in the Bachelor for Agricultural, Food and Mountain Environmental Sciences, academic level: Master’s degree, *no evaluation available*
- AY **2019/2020 Teaching assistant** (30 hours, teaching language: English) of Biochemistry and physiology of agricultural plants (6 ECTS) held by Prof. Stefano Cesco at the Free University of Bolzano in the Bachelor for Agricultural, Food and Mountain Environmental Sciences, academic level: master’s degree, *no evaluation available*

Bachelor and Master thesis supervision:

at the Free University of Bolzano

Supervisor (L-25):

Judith Ranzi, title: Impact of phosphorus deficiency on root exudation of durum wheat

AY 2025/2026

Co- supervisor (L-25):

AY 2019/20

Greta Fichter, title: "Effect of single and combined nutrient deficiency on cultivated plants"

Letizia Bernardi, title: "The role of Brassinosteroids in nutrient acquisition in plants"

AY 2020/21

David Heiss, title: "Copper extraction potential of citrate and malate in vineyard soils"

AY 2021/2022

Andreas Montagner, title: "Optimization of fertilization of soilless growing system"

Franz Waschgl, title: "Impact of plant development status on the reacquisition of root exudates"

AY 2025/2026

Judith Ranzi, title "Root exudate profile of Capelli and Svevo wheat under phosphorous deficiency "

at the Università degli Studi di Udine

Co-supervisor (LM-69):

AY 2019/20

Maria Niedrist, title: "Copper extraction potential of selected root exudates in vineyard soils"

at Wageningen University and Research

Co-supervisor (Master in Plant Sciences):

AY 2020/21

Fabio Trevisan, title: "Carbon isotope fractionation in C4 and C3 plants subjected to nutrient deficiencies"

Other academic responsibilities and memberships

- **Member** of the organizing committee of "Solute Imaging Summer School 2019", University of Natural Resources and Life Sciences, Vienna in Tulln, 12-17 September 2019
- **Section Editor** in Plant and Soil
- **Review Editor** in Plant Breeding (Frontiers in Plant Science)
- **Member** of the Società Italiana di Chimica Agraria from 2019
- **Reviewer** in the following **international peer reviewed journals**: Plos One, Rhizosphere, Chemosphere, Physiologia Plantarum, Frontiers in Plant Science, Acta Horticulturae, Journal of Plant Nutrition and Soil Science, Plant and Soil, Plant Molecular Biology, Agronomy, Environmental and Experimental Botany, Environmental Pollution, Journal of Agricultural Sciences and Technology, Plants, Scientific Reports, BMC Plant Biology, NanoImpact, PeerJ
- **Member** of the Competence Centre for Plant Health, Free University of Bolzano

Research and scholarships

and Summary of *current* research and scholarship

Raphael Tiziani is currently "junior researcher" in the group of **Agricultural Chemistry (AGRI-06/B)** of the Free University of Bolzano (Faculty of Agricultural, Environmental and Food Sciences). His current research includes the development of novel diffusive gradient in thin film techniques for sampling and localizing root exudates from soil grown plants (DGT EXUDATES project). Moreover, the studies crop/model plants adaptations to abiotic stresses (e.g. iron or phosphorus deficiencies, copper contamination) focusing on the interaction between the root, root exudates and the rhizosphere, as well as on the plants' C fractionation. He is also involved in studying the soil carbon cycle in relation to the application of cover crops in apple orchards to increase the carbon sequestration potential of agricultural soils and their biological ecosystem services (SCOOP project). Furthermore, he is involved in studying the effect of microplastics on plants and soil.

He has also been involved in two EU Horizon Europe Mission Soil Projects, HuMUS – Healthy Municipal Soils (<https://humus-project.eu/>)

and ECHO – Engaging Citizens in Soil Science: The Road to Healthier Soils (<https://echosoil.eu/>). In HuMUS he was mainly involved in the development and writing of “factsheets” with quick and easy methods to carry out soil health assessments, whereas in the ECHO project he was mainly involved in the co-creation workshops and in the development of the ECHO Soil Kit and Handbook writing.

He also actively engages in third mission dissemination by translating academic research into accessible formats for public policy makers and community stakeholders, considering also young citizen (<18).

Summary of research and scholarship during the *previous five years*

During his **PhD studies (2017-2020)** he developed a novel root exudate sampling technique, he gained insight into the carbon fractionation of plants and found for the first time that some plants can enhance their root exudate reuptake under abiotic stresses. Furthermore, he studied how different root handling affects root exudation and phosphorus uptake of model plants. Directly after his PhD he began his **first postdoc (2021-2022)** in the project titled “Spatial and temporal nutrient dynamics in the rhizosphere to unravel nutrient mobilization and uptake processes in cultivated plants, NUMICS” in which he continued his research about root exudates elucidating also the impact of earthworms or drought and heat on the root exudome.

Summary of significant achievements in research and scholarship (Research grants and contracts):

Date granted	Award Holder(s)	Funding Body	Title	Amount received
2017-2020	Raphael Tiziani (coordinator)*	Stiftung Südtiroler Sparkasse	Methoden zur Bestimmung der Nährstoffverfügbarkeit in der Rhizosphäre, um Synergien und Antagonismen zwischen Elementen vorherzusehen	60000€

*research grant for the PhD Scholarship at the Free University of Bolzano

Raphael Tiziani is/was *involved* in the following research projects:

Date granted	Award Holder(s)	Funding Body	Title	Amount received
2018-2021	Tanja Mimmo (coordinator)	Free University of Bolzano	Spatial and temporal nutrient dynamics in the rhizosphere to unravel nutrient mobilization and uptake processes in cultivated plants - NUMICS	97.000€
2017-2020	Tanja Mimmo (coordinator)	Free University of Bolzano	Rhizosphere processes affect copper bioavailability in vineyard soils - RHIZOPRO-	70.000€
2018-2021	Stefano Cesco (coordinator)	FESR 2014-2020	Hydrothermal carbonization of Biogas digestate for hydroPonics: an	237.150€

			innovative concept of bio-refinery – HB Ponics	
2022-2025	Tanja Mimmo (coordinator)	Sustainapple - Südtiroler Apfelkonsortium	Contribution of soil to carbon storage in South Tyrolean apple orchards: possible improvement measures and influence of cover crops - SCOOP	178.000€
2023-2025	Annalaura Vannuccini (coordinator) Tanja Mimmo (WP1 leader)	European Union's Horizon Europe research and innovation programme	Healthy Municipal Soils - HuMUS	194.000€
2023-2027	Tanja Mimmo (coordinator)	European Union's Horizon Europe research and innovation programme	Engaging citizens in soil science: the road to healthier soils -ECHO	1.259.000 €
2024-2026	Tanja Mimmo (coordinator)	Joint Projects – DFG D-SÜD	DGT Exudates	299.000€
2023-2025	Luigimaria Borruso (coordinator)	Free University of Bolzano	What couldn't Charles Darwin see? Exploring the hidden belowground biodiversity of Galápagos Islands- MicroDARWIN	120.000€
2025	Raphael Tiziani (Task Leader of task 4.2.3)	Biodiversa Partnership	Biodiversa+	14.600€ € (whole partnership 800+mio €)
2025-2028	Tanja Mimmo (WP leader)	Agroecology partnership	All-Facts. Agroecological Living Labs for accelerating transition	284.000€
2025-2028	Luigimaria Borruso	Agroecology partnership	CoolFarmLab - CO-creation Of Pathways to foster agroecoLogical transition of FARMS driven by Living LAB approach	295.000€
2026-2028	Tanja Mimmo	Alpoma	Scientific evaluation of soil CO ₂ sequestration - Cofib	379.320 €

2026-2028	Emanuele Boselli	European Regional Development Fund	Infrastructure for the total valorization of agroindustrial waste - ZeroResidue	2.909.322,35 €
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Scientific collaborations

At national level

1. Prof. Roberto Terzano – University of Bari (heavy metal remediation)
2. Prof. Gianpiero Vigani – University of Turin (crop physiology)
3. Dr. Luigi Lucini – University Cattolica del Sacro Cuore (metabolomics)
4. Prof. Sorgonà – Università Mediterranea di Reggio Calabria (root exudation, abiotic stress)
5. Prof. Buzzini – University of Perugia (biogeochemical cycles in soil)

At international level

1. Prof. Jakob Santner – Justus-Liebig-Universität Giessen, Germany (rhizosphere processes)
2. Prof. Markus Puschenreiter – BOKU, Austria (rhizosphere processes)
3. Prof. Eric Smolders – KU Leuven, Belgium (rhizosphere processes)
4. Prof. Ciadamidaro – Université de Bourgogne Franche-Comté, France (heavy metal pollution and root exudation)
5. Prof. Wolfram Weckwerth – University of Vienna, Austria (plant physiology)
6. Prof. Frederik van der Boom – University of Copenhagen, Denmark (root exudation)
7. Prof. Niklas Lehto – Lincoln University, New Zealand (carbon cycling)
8. Prof. Alice Pita Barbosa – Universidade Federal do Rio Grande do Sul (microplastic contamination)

Publications

Chronological order with the **applicant's name** in bold

1. *Mimmo*, T., **Tiziani**, R., Valentinuzzi, F., Lucini, L., Nicoletto, C., Sambo, P., Scampicchio, M., Pii, Y., & Cesco, S. (2017). Selenium biofortification in fragaria × ananassa: Implications on strawberry fruits quality, content of bioactive health beneficial compounds and metabolomic profile. *Frontiers in Plant Science*, 8. <https://doi.org/10.3389/fpls.2017.01887>
2. *Valentinuzzi*, F., Maver, M., Fontanari, S., Mott, D., Savini, G., **Tiziani**, R., Pii, Y., Mimmo, T., & Cesco, S. (2018). Foliar application of potassium-based fertilizer improves strawberry fruit quality. In *Acta Horticulturae* (Vol. 1217). <https://doi.org/10.17660/ActaHortic.2018.1217.48>
3. *Celletti*, S., Pii, Y., Valentinuzzi, F., **Tiziani**, R., Fontanella, M. C., Beone, G. M., Mimmo, T., Cesco, S., & Astolfi, S. (2020). Physiological responses to fe deficiency in split-root tomato plants: Possible roles of auxin and ethylene? *Agronomy*, 10(7). <https://doi.org/10.3390/agronomy10071000>
4. ***Tiziani**, R., Mimmo, T., Valentinuzzi, F., Pii, Y., Celletti, S., & Cesco, S. (2020). Root Handling Affects Carboxylates Exudation and Phosphate Uptake of White Lupin Roots. *Frontiers in Plant Science*, 11. <https://doi.org/10.3389/fpls.2020.584568>

5. *Feil, S. B., Pii, Y., Valentinuzzi, F., Tiziani, R., Mimmo, T., & Cesco, S. (2020). Copper toxicity affects phosphorus uptake mechanisms at molecular and physiological levels in Cucumis sativus plants. Plant Physiology and Biochemistry, 157. <https://doi.org/10.1016/j.plaphy.2020.10.023>*
6. **Tiziani, R., Pii, Y., Celletti, S., Cesco, S., & Mimmo, T. (2020). Phosphorus deficiency changes carbon isotope fractionation and triggers exudate reacquisition in tomato plants. Scientific Reports, 10(1). <https://doi.org/10.1038/s41598-020-72904-9>*
7. **Tiziani, R., Puschenreiter, M., Smolders, E., Mimmo, T., Herrera, J. C., Cesco, S., & Santner, J. (2021). Millimetre-resolution mapping of citrate exuded from soil-grown roots using a novel, low-invasive sampling technique. Journal of Experimental Botany, 72(10). <https://doi.org/10.1093/jxb/erab123>*
8. *Hullot, O., Lamy, I., Tiziani, R., Mimmo, T., & Ciadamidaro, L. (2021). The effect of earthworms on plant response in metal contaminated soil focusing on belowground-aboveground relationships. Environmental Pollution, 274. <https://doi.org/10.1016/j.envpol.2021.116499>*
9. *Alzate Zuluaga, M. Y., Martinez de Oliveira, A. L., Valentinuzzi, F., Tiziani, R., Pii, Y., Mimmo, T., & Cesco, S. (2021). Can Inoculation With the Bacterial Biostimulant Enterobacter sp. Strain 15S Be an Approach for the Smarter P Fertilization of Maize and Cucumber Plants? Frontiers in Plant Science, 12. <https://doi.org/10.3389/fpls.2021.719873>*
10. *Cesco, S., Lucini, L., Miras-Moreno, B., Borruso, L., Mimmo, T., Pii, Y., Puglisi, E., Spini, G., Taskin, E., Tiziani, R., Zangrillo, M. S., & Trevisan, M. (2021). The hidden effects of agrochemicals on plant metabolism and root-associated microorganisms. Plant Science, 311. <https://doi.org/10.1016/j.plantsci.2021.111012>*
11. *Bouaicha, O., Mimmo, T., Tiziani, R., Praeg, N., Polidori, C., Lucini, L., Vigani, G., Terzano, R., Sanchez-Hernandez, J. C., Illmer, P., Cesco, S., & Borruso, L. (2022). Microplastics make their way into the soil and rhizosphere: A review of the ecological consequences. Rhizosphere, 22. <https://doi.org/10.1016/j.rhisph.2022.100542>*
12. *Bouaicha, O., Tiziani, R., Maver, M., Lucini, L., Miras-Moreno, B., Zhang, L., Trevisan, M., Cesco, S., Borruso, L., & Mimmo, T. (2022). Plant species-specific impact of polyethylene microspheres on seedling growth and the metabolome. Science of the Total Environment, 840. <https://doi.org/10.1016/j.scitotenv.2022.156678>*
13. **Tiziani, R., Miras-Moreno, B., Malacrinò, A., Vescio, R., Lucini, L., Mimmo, T., Cesco, S., & Sorgonà, A. (2022). Drought, heat, and their combination impact the root exudation patterns and rhizosphere microbiome in maize roots. Environmental and Experimental Botany, 203. <https://doi.org/10.1016/j.envexpbot.2022.105071>*
14. *Cantarella, G., Madagalam, M., Merino, I., Ebner, C., Ciocca, M., Polo, A., Ibba, P., Bettotti, P., Mukhtar, A., Shkodra, B., Inam, A. K. M. S., Johnson, A. J., Pouryazdan, A., Paganini, M., Tiziani, R., Mimmo, T., Cesco, S., Münzenrieder, N., Petti, L., ... Lugli, P. (2023). Laser-Induced, Green and Biocompatible Paper-Based Devices for Circular Electronics. Advanced Functional Materials, 33(17). <https://doi.org/10.1002/adfm.202210422>*
15. *Rascio, I., Gattullo, C. E., Porfido, C., Allegretta, I., Spagnuolo, M., Tiziani, R., Celletti, S., Cesco, S., Mimmo, T., & Terzano, R. (2023). Fire-induced effects on the bioavailability of potentially toxic elements in a polluted agricultural soil: implications for Cr uptake by durum wheat plants. Environmental Science and*

- Pollution Research, 30(3). <https://doi.org/10.1007/s11356-022-22471-5>
16. ***Tiziani**, R., Pranter, M., Valentinuzzi, F., Pii, Y., Luigimaria, B., Cesco, S., & Mimmo, T. (2023). Unraveling plant adaptation to single and combined nutrient deficiencies in a dicotyledonous and a monocotyledonous plant species. *Plant Science*, 335. <https://doi.org/10.1016/j.plantsci.2023.111793>
 17. ***Trevisan**, F., **Tiziani**, R., Hall, R. D., Cesco, S., & Mimmo, T. (2023). $\delta^{13}\text{C}$ as a tool for iron and phosphorus deficiency prediction in crops. *Plant Direct*, 7(3). <https://doi.org/10.1002/pld3.487>
 18. **Mugnai**, G., Pinchuk, I., Borruso, L., **Tiziani**, R., Sannino, C., Canini, F., Turchetti, B., Mimmo, T., Zucconi, L., & Buzzini, P. (2024). The hidden network of biocrust successional stages in the High Arctic: Revealing abiotic and biotic factors shaping microbial and metazoan communities. *Science of the Total Environment*, 926. <https://doi.org/10.1016/j.scitotenv.2024.171786>
 19. ***Trevisan**, F., **Tiziani**, R., Cesco, S., & Mimmo, T. (2024). Timing matters: Exudates collection duration impacts tomato root exudome under nutrient deficiencies. *Rhizosphere*, 30. <https://doi.org/10.1016/j.rhisph.2024.100874>
 20. ***Trevisan**, F., Waschler, F., **Tiziani**, R., Cesco, S., & Mimmo, T. (2024). Exploring glycine root uptake dynamics in phosphorus and iron deficient tomato plants during the initial stages of plant development. *BMC Plant Biology*, 24(1). <https://doi.org/10.1186/s12870-024-05120-6>
 21. Landolfi M., **Tiziani** R., Riviere S., Trevisan F., Petraretti M., Jäger H., Cesco S., Gerzabek M. H., Keiblinger K., Zehetner F., Villa F., Mimmo T. and Borruso L. 2025, Life on the edge: mineral incrustations colonized by fungal communities in the sulfur fumarole on Sierra Negra volcano (Galápagos Archipelago)R. *Soc. Open Sci.*12250010, <http://doi.org/10.1098/rsos.250010>
 22. **Bouaicha**, O., Trevisan, F., **Tiziani**, R., Brenner, M., Weckwerth, W., Onelli, E., Moscatelli, A., Mimmo, T., & Borruso, L. (2025). From the shoot to the rhizosphere: The short-term cascade impact of aerial microplastic. *Environmental and Experimental Botany*, 237, 106222. <https://doi.org/10.1016/j.envexpbot.2025.106222>Alice plastic
 23. **Pita-Barbosa**, A., Bouaicha, O., **Tiziani**, R., Chibesa, M. C., Borruso, L., Cesco, S., & Mimmo, T. (2025). Combined impact of short-term phosphorus deficiency and microplastic contamination on tomato mineral elements, chlorophyll fluorescence and root exudates. *Plant Physiology and Biochemistry*, 229, 110496. <https://doi.org/10.1016/j.plaphy.2025.110496>
 24. **Betina Debastiani Benato**, Angie Geraldine Sierra Rativa, Raquel Vargas Olsson, Yugo Lima-Melo, Eduardo Santos, Gabriel Sgarbiero Montanha, Jover da Silva Alves, Lucas Roani Ponte, Victor Hugo Rolla Fiorentini, Fernando Mateus Michelin Betin, Francieli Ortolan, João Paulo Rodrigues Marques, Raul Antonio Sperotto, Hudson Wallace Pereira de Carvalho, Stefano Cesco, Tanja Mimmo, **Raphael Tiziani**, Gian Maria Beone, Nathalia Navarro, Hannetz Roschztardt, Carlos Alberto Pérez, Ricardo Fabiano Hettwer Giehl, Marcia Margis-Pinheiro, Felipe dos Santos Maraschin, Felipe Klein Ricachenevsky, Double knockout of rice Vacuolar Iron Transporters OsVIT1 and OsVIT2 reveals a trade-off between iron biofortification and iron excess tolerance, *Journal of Experimental Botany*, 2025; eraf505, <https://doi.org/10.1093/jxb/eraf505>
 25. **Fracasso I.**, Foley L., **Tiziani R.** et al. Soil organic carbon fractions and their associated bacterial and fungal abundance in alpine

- ecosystems. *Sci Rep* (2025). <https://doi.org/10.1038/s41598-025-31187-8>.
26. *Ilaria Fracasso*, Ekaterina Timofeeva, **Raphael Tiziani**, Oussama Bouiacha, Georg Leitinger, Luigimaria Borruso, Tanja Mimmo. Five years of oxen *grazing* enhances soil carbon and structure in alpine vineyards. *Sci Rep*. 2026 Jan 23. doi: 10.1038/s41598-026-35761-6.
 27. ***Raphael Tiziani**, Fabio Trevisan, Ondřej Hodek, Sandra Jämtgård, Thomas Moritz, Oussama Bouaicha, Mirriam C Chibesa, Ilaria Fracasso, Tanja Mimmo, Deciphering underexplored rhizosphere processes: root acquisition of citric acid and its metabolic journey in tomato, *Journal of Experimental Botany*, 2026, <https://doi.org/10.1093/jxb/eraq066>
 28. *Mirriam Chishala Chibesa*, **Raphael Tiziani**, Tobias Reineke, Mahdi Jalali, Jakob Santner, Tanja Mimmo, *Journal of Visualized Experiments (JoVE)*, Polyacrylamide ZrOH Hydrogels for Spatially Resolved Sampling of Carboxylates Exuded from Roots Growing in Soil, 2026
 29. *Oussama Bouaicha*, **Raphael Tiziani**, Adina Eliana Schmid, Nadine Praeg, Paul Illmer, Daniele Del Buono, Debora Puglia, Ilaria Fracasso, Luigimaria Borruso, Tanja Mimmo; Aerial polyethylene deposition alters strawberry physiology and rhizosphere functionality, *Rhizosphere*, 2026, <https://doi.org/10.1016/j.rhisph.2026.101313>

Further data

Oral presentations at scientific conferences:

Raphael Tiziani, Markus Puschenreiter, Erik Smolders, Tanja Mimmo, José Carlos Herrera, Stefano Cesco, and Jakob Santner; Quantifying and mapping citrate exudation in soil-grown root systems, In: *Proceedings of EGU general Assembly 2020 (4-8 may 2020, Vienna)*, <https://doi.org/10.5194/egusphere-egu2020-14587>

Raphael Tiziani, Markus Puschenreiter, Erik Smolders, Tanja Mimmo, José Carlos Herrera, Stefano Cesco and Jakob Santner; Quantificazione in-situ del rilascio di citrato da piante di lupino bianco; In: *Proceedings of Conferenza della società italiana di chimica agraria 2020, Piacenza 7-8 September 2020*

Raphael Tiziani, Fabio Trevisan, Youry Pii, Silvia Celletti, Stefano Cesco, and Tanja Mimmo; Tomato plants reuptake root exudates and alter carbon isotope fractionation under phosphorus deficiency; In: *Proceedings of vEGU general Assembly 2021*(<https://meetingorganizer.copernicus.org/EGU21/EGU21-9459.html>) 19-30 April 2021.

Tiziani R., Trevisan F., Pii Y., Celletti S., Cesco S., Mimmo T., Root exudates reuptake and alteration of carbon isotope fractionation by tomatoes under P deficiency; In: *Proceedings of "Second Joint Meeting on Soil and Plant System Sciences 2021"*, 20-23 Sept. Turin, 2021

Tiziani R., *Methods in rhizosphere research*, in: *Agricultural Chemistry Winter School 2023, Udine, Italy, 6-9 Feb. 2023*

David Heiss, **Raphael Tiziani**, Stefano Cesco, Luigimaria Borruso, Elizabeth Foley, and Tanja Mimmo, Copper extraction potential of citrate and malate in vineyard soils, In: *Proceedings of "First Joint International Conference of Biogeochemistry of Trace Elements (ICOBTE) & International Conference of Heavy Metals (ICHMET) 2023"*, 6-10 Sept. 2023, Wuppertal (DE)

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Raphael Tiziani, Fabio Trevisan, Youry Pii, Silvia Celletti, Stefano Cesco, Tanja Mimmo; "Root exudates reuptake and alteration of carbon isotope fractionation by tomato plants under phosphorus deficiency"; Agricultural Chemistry Winter School (ACWS) 2022 (Udine, IT, 14th-17th February 2022, online edition)

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Trevisan Fabio, **Raphael Tiziani**, Scott Buckley, Sandra Jämtgård, Stefano Cesco, Tanja Mimmo; "Microdialysis as a tool to study rhizosphere dynamics"; Centennial Celebration and Congress of the International Union of Soil Sciences, peer-reviewed speaker (Firenze (IT), 19th-21st May 2024)

Trevisan Fabio, **Raphael Tiziani**, Ondrej Hodek, Thomas Moritz, Sandra Jämtgård, Stefano Cesco, Tanja Mimmo; "Fate of root uptaken citrate in tomato plants suffering phosphorus and iron deficiency"; International Society of Root Research 12th International Symposium, peer-reviewed speaker (Leipzig (DEU), 2nd-7th June 2024)

Dr. Oussama Bouaicha, Dr. Fabio Trevisan, Dr. **Raphael Tiziani**, Prof. Elisabetta Onelli, Prof. Alessandra Moscatelli, Prof. Tanja Mimmo, Prof. Luigimaria Borruso; "Cascade Effects of MP Aerial Deposition on the Exudomes and Associated Microbiomes", Rhizosphere VI (Edinburgh), 15-19.06.2025.

Alice Pita Barbosa, Oussama Bouaicha, Fabio Trevisan, **Raphael Tiziani**, Mirriam Chibesa Chishala, Stefano Cesco, Luigimaria Borruso, Tanja Mimmo; Root exudate responses to combined phosphorus deficiency and microplastic stress, 57th Annual Conference of the German Society of Plant Nutrition; Giessen (GER), 29.09-01.10.2025

Fabio Trevisan, Mahdi Jalali, Tobias Reineke, Mirriam Chishala Chibesa, **Raphael Tiziani**, Tanja Mimmo, Jakob Santner; Validation of a novel method for carboxylate exudate sampling using diffusive gradients in thin films (DGT) and artificial roots; Rhizosphere VI (Edinburgh, UK), 15-19.06.2025, poster presentation

Mirriam Chishala Chibesa, **Raphael Tiziani**, Fabio Trevisan, Tobias Reineke, Mahdi Jalali, Jakob Santner, Tanja Mimmo; Polyacrylamide ZrOH Hydrogels for precise and spatially resolved Root-Exuded Carboxylate Sampling in Soil; Rhizosphere VI (Edinburgh, UK), 15-19.06.2025, poster presentation

Third mission

Luigimaria Borruso, **Raphael Tiziani**, "Come funzionano i vaccini COVID-19?/ Wie wirken COVID-19-Impfstoffe?",

https://www.youtube.com/watch?v=nzbKK0_n57s,

<https://www.youtube.com/watch?v=DXhQIGkvFmo> , Creation of videos to explain the mechanism of action of vaccines, 2021

Raphael Tiziani, Tanja Mimmo; “HuMUS Focus Group Workshop”, 7.11.2023, Bolzano – meeting with local stakeholders to discuss policy about soil health in the context of the EU Horizon Mission Soil Project HuMUS (<https://humus-project.eu/>).

Tanja Mimmo, Borruso Luigimaria, Eren Taskin, Mauro Maver, **Raphael Tiziani**, “Festival le mille e una scienza”, Castel Mareccio, Bolzano, 9-12.11.2023 – scientific divulgation for children

Raphael Tiziani, Luigimaria Borruso; Laboratorium "Projektwoche Rendezvous mit dem Traumberuf. Il suolo: cosa c'è sotto i nostri piedi?" for High School Students. Free University of Bolzano, 24.10.2023 – orientation for high school students

Raphael Tiziani, Tanja Mimmo, Claudia Capello, Natalia Rastorgueva, “Bodengesundheit im Fokus”, HuMUS, ECHO Workshps; 16.05.2024, Bolzano – meeting with local stakeholders to discuss soil health and ECHO Workshop in the context of the two EU Horizon Mission Soil Projects ECHO (<https://echosoil.eu/>) and HuMUS (<https://humus-project.eu/>)

Raphael Tiziani, Natalia Rastorgueva, Claudia Capello, Tanja Mimmo, Celine Laurent, Baquy M Abdulaha Al, “Gemeinsamer Bio – Wiesenratscher”, 26.07.2024, Salurn – presentation of the EU Horizon Misson Soil project “HuMUS” (Healthy Municipal Soils, <https://humus-project.eu>, Bodengesundheit im Fokus II)

Raphael Tiziani, presentation of the chemical labs and research group/interests (Tour laboratory) at the “Bachelor Days” of the Free University of Bolzano, 2022/2023/2024/2025/2026

Raphael Tiziani, presentation of the research group and topics for high school students (Laimburg, Oberschule für Landwirtschaft; Fachschulen Fürstenburg-Kortsch) and high school teachers on several occasions, 2023/2024/2025, Free University of Bolzano

Raphael Tiziani, Natalia Rastorgueva, Baquy M Abdulaha Al, Tanja Mimmo, Terra Madre, cerimonia per la firma istituzionale del manifesto europeo per il suolo, 30.09.2024, Parco Dora, Torino, online presentation of Pilot Case Study of HuMUS ((Healthy Municipal Soils, <https://humus-project.eu>) project.

Raphael Tiziani, “Transnationales Vernetzungstreffen zum Thema Bodenschutz (<https://www.zukunftstraumland.at/termine/transnationales-ernetzungstreffen-2024/>)“, Vienna, 01.10.2024; using the method of ‘*Collective Story Harvesting*,’ story harvesting and key lessons on soil protection drawn from six multi-actor projects, Raphael Tiziani represented the EU Mission Soil Project HuMUS (Healthy Municipal Soils, <https://humus-project.eu>) project.

Raphael Tiziani, Tanja Mimmo, Natalia Rastorgueva, “Bodengesundheit im Fokus III; Territorialmanagementabkommen”, HuMUS Workshop; 13.12.2024, Bolzano – meeting with local stakeholders to discuss soil health and create a local territorial management agreement; HuMUS (<https://humus-project.eu/>)

Tanja Mimmo, Luigimaria Borruso, **Raphael Tiziani**, Elizabeth Rose Foley, Rita Noto, Eren Taskin, Fabio Trevisan, *Agrar und Forstbericht 2024*, Der Beitrag von Einsaaten im Südtiroler Obstbau zur Kohlenstoffsequestrierung, 2.6.1

Tanja Mimmo, Celine Laurent, Claudia Capello, **Raphael Tiziani**, "Projekt "Boden", Mittelschule Schlanders, presenting ECHO and the importance of soil health to middle school students (echosoil.eu), 29.05.2025, <https://www.ssp-schlanders.it/veranstaltungen/projekt-boden/>

Luigimaria Borruso, Seçil Uğur Yavuz, Tanja Mimmo, Veronica Martini, Manuela Dasser, Edoardo Pasolli, Fernanda Loayza, David Guijarro, Aart van Bezooijen, Elisabeth Tauber, **Raphael Tiziani**, Oussama Bouicha, Ilaria Fracasso, "What is DNA", Microdarwin Poster for children to explain them what DNA and biodiversity is, 24.06.2025

Tanja Mimmo, Luigimaria Borruso, **Raphael Tiziani**, Elizabeth Rose Foley, Rita Noto, Eren Taskin, Fabio Trevisan, "Einsaaten als Öko-Booster", unibzmagazine (<https://www.unibzmagazine.it/it/magazine/article/einsaaten-als-oeko-booster>), 22.05.2025

Tanja Mimmo, **Raphael Tiziani**, Press Conference for "Contribution of soil to carbon storage in South Tyrolean apple orchards: possible improvement measures and influence of cover crops – SCOOP", 04.11.2025

Raphael Tiziani, presentation of the research group and topics for high school students (Istituto di Istruzione Secondaria Superiore "Galileo Galilei) and high school teachers on several occasions, 2025, Free University of Bolzano

Tanja Mimmo, **Raphael Tiziani**, Press Conference for "Contribution of soil to carbon storage in South Tyrolean apple orchards: possible improvement measures and influence of cover crops – SCOOP", 04.11.2025

Raphael Tiziani, presentation of the research group and topics for high school students (Istituto di Istruzione Secondaria Superiore "Galileo Galilei) and high school teachers on several occasions, 2025, Free University of Bolzano

Raphael Tiziani, Torresani Michele, Zanotelli Damiano, Schiavo Massimiliano, Accademia Rete PAC, Connessioni Rurali, Formazione, ricerca, innovazione per il futuro, 2025.

Raphael Tiziani, Die ANTENNE/RADIO2000 03.11.2025 at 11.30 Radio report "Contribution of soil to carbon storage in South Tyrolean apple orchards: possible improvement measures and influence of cover crops – SCOOP"

Raphael Tiziani, Tanja Mimmo, TV Broadcast on ORF 2 Südtirol Heute about "Contribution of soil to carbon storage in South Tyrolean apple orchards: possible improvement measures and influence of cover crops – SCOOP" <https://on.orf.at/video/14298087/suedtirol-heute-vom-;> 04.11.2025 at 18.30 and 19.30.

Raphael Tiziani, Tanja Mimmo, **Article in local newspaper** „Dolomiten“ Contribution of soil to carbon storage in South Tyrolean

apple orchards: possible improvement measures and influence of cover crops – SCOOP, 06.11.2025

Bodengesundheit im Fokus IV und Agrarökologie Workshop I, Tanja Mimmo, Natalia Rastorgueva, Theresa Meyer, Baquy M Abdulaha Al, **Raphael Tiziani**, All-FACTS Agroecology Project, meeting with local agricultural stakeholders to discuss about agroecological transition, 27.11.25

Raphael Tiziani, Torresani Michele, Zanotelli Damiano, Schiavo Massimiliano, Accademia Rete PAC, Conessioni Rurali , Formazione, ricerca, innovazione per il futuro, 2025. Evento di lancio sede unibz

Luigimaria Borruso, **Raphael Tiziani**, Tanja Mimmo, presentation of research data of a case study about soil biodiversity in apple orchards for local farmer stakeholders, 13.02.2026

Bodengesundheit im Fokus V und Agrarökologie Workshop II, Tanja Mimmo, Natalia Rastorgueva, Theresa Meyer, **Raphael Tiziani**, All-FACTS Agroecology Project, meeting with local agricultural stakeholders to discuss about agroecological transition, 27.02.2026

Raphael Tiziani, Luigimaria Borruso, “Rendezvous mit dem Traumberuf; il suolo, cosa c'è sotto i nostri piedi”. Event for high school students, 24.02.2026

Statement of interest

As a researcher in Agricultural Chemistry, I will contribute to advancing sustainable practices in mountain agriculture by focusing on soil health and soil-plant-microorganisms interactions. I plan to study the effects of biotic and abiotic stresses on both crop plants and model plants relevant to mountainous agricultural areas with special emphasis on nutrient dynamics.

Over the past years, I have been involved in several research projects on these topics, gaining a solid background in agricultural chemistry and related fields. This experience has provided me with extensive expertise in the analytical methods used to study rhizosphere processes such as nutrient dynamics and soil-plant-microorganism interactions. Additionally, my frequent assistance with project writing and coordination has prepared me to actively pursue funding opportunities for our research initiatives, ensuring the continuous advancement of our work. My research will not only aim to improve crop productivity and soil health but also to provide critical insights into how climate change impacts soil properties and agricultural outputs in mountainous regions.

Furthermore, I have experience in academic teaching and find it very inspiring to educate the next generation of students. By sharing my knowledge and enthusiasm for agricultural chemistry, I hope to inspire and mentor future scientists who will continue to innovate and advance the field. Through my research and teaching, I am dedicated to supporting the resilience and productivity of mountain agricultural areas and contributing to the overall mission and reputation of the university.

Language competence

German: Mother tongue (C1)

Italian: C1 (Patentino di Bilinguismo della Provincia di Bolzano, 2016)

English: C1 (certificate of the Free University of Bolzano, 2020)

Awards

Winner of the award “**Michele Stanca**” for the **best Ph.D thesis** of the “Associazione Italiana Società Scientifiche Agrarie” 2022

Bibliometry

ResearchGate (March 2026)

30 published and accepted original papers in international ranked journals (ResearchGate). Sum of citations 741, H-index: 14

**Additional
information**

Driving licence B, A2
Privacy in research test

Date 31.03.2026