

Education

- 10/2018 – 03/2022 **Ph.D. in Agrobiosciences.** Sant'Anna School of Advanced Studies, Pisa, Italy.
Supervisor: Prof. Pietro Tonutti.
Dissertation: Selenium enrichment of tomato plants: effects on fruit quality, ripening physiology and postharvest behaviour. (Title acquisition date: 29.07.2022)
Summary: Together with 31 experts from 9 organizations, Anton developed a technology which might allow to overcome microelement deficiency. He conducted 4 field and 3 laboratory experiments on tomato biofortification, analyzed collected data, and revealed biological mechanisms triggered by selenium in tomato plants. **The results** are reported at **5 scientific conferences**, in **4 peer-reviewed publications**, and in the PhD dissertation, awarded by Plants journal as the best PhD Thesis in 2022.
- 02/2017 – 01/2018 **Agricultural Biotechnology** exchange program (Erasmus+). Szent István University, Gödöllő, Hungary.
Average grade: 4.93/5
- 09/2016 – 08/2018 **MSc in Agronomy** (*with honors*). Specialization: **Biotechnology**.
Russian State Agrarian University – Moscow Timiryazev Agricultural Academy, Moscow (Russia).
Thesis: The implementation of a molecular marker system in breeding for increasing lycopene content in tomato fruit. (Title acquisition date: 28.08.2018)
Average grade: 5/5
- 09/2012 – 08/2016 **BCs in Agronomy.** Specialization: **Biotechnology, genetics and crop breeding**.
Russian State Agrarian University – Moscow Timiryazev Agricultural Academy, Moscow (Russia).
Thesis: Developing lycopene synthesis coding genes marker system in *Solanum lycopersicum* fruit. (Title acquisition date: 01.08.2016)
Average grade: 4.4/5

Additional training

- 06/2023 **Proposal writing** Workshop, Karl-Franzens-Universität Graz, Austria
Throughout the workshop, Anton was trained on how to develop a tailor-made interdisciplinary research proposal corresponding to the top-notch EU funding standards on the example of the Marie Skłodowska-Curie Postdoctoral Fellowship (MSCA-PF).
Acquired skills: proposal writing, networking, project planning.
- 05/2023 Digital small-scale **phenotyping**. Training by Microscan Phenospex (NL) and IRET, CNR. Pisa, Italy.
- 05/2022 Seasonal School **Sustainability & Food Governance**. Sant'Anna School of Advanced Studies, Pisa, Italy.
The School was focused on the urgent topic of food sustainability, exploring how to build sustainable and climate-resilient agri-food systems through a dialogue between social and life sciences.
Acquired skills: problem-solving, decision-making, strategic communication, leadership.
- 04/2022 Seasonal School in **Techno-scientific diplomacy**, University of Padova and University of Roma Tre, Italy.
The school deepened my understanding of the evolution of international relations and diplomacy in the context of science and technology from the Cold War to current scenarios. As a result, Anton co-authored a policy brief "Sino-Russian relations under the impact of the Ukraine invasion and climate warming. What Techno-Scientific Diplomacy may offer?" Shiriaev A, Modestino R.
Skills: Crisis management, public speaking, negotiation, analytical strategies (SWOT, PESTEL, VRIO).
- 03/2022 Seasonal School **Advancements in Postharvest technologies** to reduce losses and improve nutritional and functional properties of fruit and vegetables. Sant'Anna School of Advanced Studies, Pisa, Italy.
Attending this Seasonal School, Anton have developed a comprehensive view of the up-to-date F&V supply-chain innovations and the ongoing direction of the research in this multidisciplinary sector.
Acquired skills: New insights in ripening, senescence, and postharvest physiology, storage protocols, nutritional and functional properties of fruit and vegetables.
- 10/2021 – 11/2021 **Science Diplomacy** course. Friedrich-Alexander University (FAU) within EELISA European University, Erlangen-Nürnberg, Germany.

Within the course, Anton studied the theory and practice of science diplomacy and learned how geopolitics and international affairs are intertwined and how they depend on science and technology.

Acquired skills: team building, qualitative research.

09/2013 – 07/2016

Qualification of **Interpreter in the field of professional communication** (English ↔ Russian). Linguistic Educational Center, Russian State Agrarian University – Moscow Timiryazev Agricultural Academy.

Acquired skills: Interpreter at international exhibitions, meetings, foreign delegation escorting, translation of articles in the major speciality (Agronomy), translation analysis.

Average grade: 4.4 (Title acquisition date: 06.07.2015)

08/2015

Seasonal School **Biotechnologies in Agriculture**, Russian State Agrarian University – Moscow Timiryazev Agricultural Academy, Moscow (Russia).

Working experience

09/2022 – Present

Research fellow (borsista). Italian National Research Council (CNR), Research Institute on Terrestrial Ecosystems (IRET), Pisa, Italy. Working on the ENI-funded project aimed to help detoxify hyper-saline soil and water polluted during petrochemicals exploitation using functional **endophytes-assisted phytoremediation** in halophytes (*Suaeda fruticosa* and *Halocnemum strobilaceum*).

Acquired skills: experimental design imitating combined **anthropogenic impact on ecosystem** (salinity + hydrocarbons pollution). Morpho-physiological monitoring of halophytes. GC-MS analysis of hydrocarbons (VOCs, IPA), plant stress assessment: evaluation of photosynthetic activity determined by Minlpam. Data collection, interpretation and statistical analysis (R-Studio).

01/2022 – 09/2022

Collaborator (CoCoCo). The Crop Science Research Center, Sant'Anna School of Advanced Studies, Pisa, Italy. Collaborating on the project aimed to improve **nutraceutical properties** of olive oil.

Acquired skills: processing and sampling of the olives treated in a hydrocooling system.

08/2021 – 12/2021

Visiting researcher (Erasmus+). Laboratory of Genomics and Biotechnology of Fruit, INP-ENSAT, Toulouse, France.

Supervisors: Prof. Julien Pirrello, Prof. Pietro Tonutti.

Analyzing biological **Big Data**, Anton investigated how selenium is regulating physiological processes in plants through transcriptional regulation.

Acquired skills: RNA-seq **library preparation** (Illumina NovaSeq 6000), quality control and statistical analysis of NGS Data using **R programming** and **bash scripting**, manipulation of the external computational cluster in **UNIX** environment.

02/2018 – 08/2018

Laboratory assistant. Laboratory of **Agrobiotechnology**, SINTOL Company / All-Russia Research Institute of Agricultural Biotechnology / Ilyinichna (crop breeding company), Moscow.

I contributed to introducing agricultural innovation in traditional crop breeding. Specifically, Anton designed a system of molecular markers for the genes increasing the content of lycopene in tomatoes. Results were discussed in my Master's dissertation, and were shared with the breeding company, working in tomato F1 hybrids seeds production.

Acquired skills: DNA extraction and quantification, primer design and validation, **PCR** optimization, gel and capillary electrophoresis, **Fragment Analysis**.

05/2014 – 06/2014

Consultant. JSC August Inc., Moscow.

Acquired skills: **Advisory service**, communication, sales reporting in retail (crop protection).

Internships

07/2021

Visiting researcher. University of Bari (Italy). Performed the trial showed that selenium decreased pathogen incidence and may **reduce postharvest losses**.

I carried out pathological experiment on selenium-enriched tomato fruit and tested in-vitro if the development of fungal pathogens *Botrytis cinerea* and *Alternaria alternata* may be impacted by selenium.

Acquired skills: qualitative and quantitative assessment of fungal infection.

06/2015 – 09/2015

Internship. All-Russian Scientific Research Institute of Horticulture, Moscow Region.

I was collaborating with a tomato breeding company and performing phenotyping, and analysis of plant pigments (chlorophyll *a* and *b*, lycopene) using liquid spectrophotometry. My results allowed to select the genotypes for the crossing, aimed to introduce new tomato F1 hybrids with increased carotenoid content.

Acquired skills: Phenotyping, basic **metabolomic analysis** applied in F1 tomato hybrids breeding.

Volunteering

- 08/2022 – Present The Good Scientists (NGO). Co-Founder, Outreach Officer. Working on the **strategic plan, funding proposals** and organizing events.
- 05/2017 – 07/2017 Freelance **fixer and producer**. Hungary. To understand the socio-economic reasons of homelessness in Budapest, Anton found an opportunity to spend 3 days at work with the social worker, **interviewed** her and 10 persons in vulnerable living situations. My **analytical report** become a part of the project The Invisibles: How thousands of homeless have become a Budapest landmark. 360° Media, 2018 ([in Russian](#)).

Teaching

- 01/2022 A seminar: "Why tomatoes need selenium and why scientists need mobility". Offered to Bachelor's, Master's and PhD students at Russian State Agrarian University – Moscow Timiryazev Agricultural Academy (Russia).
- 06/2023 A lecture for high school students (Scuola e Lavoro, in Italian) "Le possibilità della fytoremediation per la bonifica dei ambienti", 2 groups, 4 hours training at IRET, CNR.

Languages

Russian: mother tongue; English: fluent (C1); Italian: independent (B2), Hungarian: basic (A1).

Technical skills

Plant physiology: Morpho-physiological observations, monitoring plants under various **stress conditions** (drought, temperature, **toxic metals, salinity, petrochemical pollution**). Evaluation of photosynthesis and respiration: fluorimetry and CO₂/H₂O gas analysis (CIRASII).

Quantitative observation of fruit ripening: ethylene and CO₂ respiration measurement with Gas Chromatography (GC). Color evolution measurement and representation in CIELAB Color Space and Hue angle (colorimetry).

Qualitative analysis of fruit: titratable acidity, Soluble Solid Content and taste index.

Biochemistry: Mineral composition determination via Atomic Absorption (**AA**) Spectrometry; Assessment of **biochemical composition:** Volatile organic compounds analysis (VOCs) using gas chromatography mass spectrometry (**GC-MS**), library of compounds and method development, preparing and analyzing samples, quality control and GC-MS chromatogram quantification. Carotenoids and polyphenols assays using High Performance Liquid Chromatography (**HPLC**); Near-infrared spectroscopy; basics of Nuclear Magnetic Resonance (**¹H-NMR**).

Molecular biology: Nucleic acids extraction and quantification, primer design and validation, PCR optimization, gel and capillary electrophoresis, basics of Fragment Analysis. RT-PCR, gene expression analysis (qPCR). RNA-Seq library preparation (NovaSeq 6000 kit by Illumina), analysis of biological Big Data obtained from NGS, Differentially Expressed genes and Gene Ontology enrichment analysis.

Greenhouse and field trials: Experimental design, setting up and maintenance of **hydroponic plant growth systems**, nutrient solution preparation, and quality monitoring. Samples collection, storing and preparation for micro and macro-nutrients, biochemical and molecular analyses.

Editorial: research paper writing, editing, presenting. Communication with editorial offices as a corresponding author. Participation to peer reviewing process of scientific articles for *Grassland Science* journal (2022).

Digital: Statistical analysis using **R Software/R Studio language**, JMP SAS, Prism Pad. **Bioinformatics:** Big Data curation on external computational cluster using **UNIX**-based tools for NGS applications (FastQC, TrimGalore, Star aligner, Samtools, FeatureCounts Modules), High-throughput transcriptomic data quality check and analysis using Bioconductor package DESeq2, Gene ontology analysis and interpretation using Shiny OG, Panther, KEGG (Kyoto Encyclopedia of Genes and Genomes). Primer design with Quant Prime. **Metabolomics:** NIST, Amdis, Cytoscape. **Website development:** Wixx, Elementor and WordPress platforms. **Computer-assisted translation:** Trados, PROMT. **Digital phenotyping:** currently obtaining training on small-scale phenotyping using PlantEye MicroScan (PhenospeX, NL), experimental design via HortControl software and data processing through CloudCompare.

Personal interests

Active in non-profit initiatives in the fields of public health, an author of over 100 poetry pieces in Russian and English.

Publications

- Selenium biofortification impacts tomato fruit metabolome and transcriptional profile at ripening. Shiriaev A, Brizzolara S, Pirrello J, Maza E, Pezzarossa B, Sorce C, Martinelli F, Malorgio F, Tonutti P. *Journal of Agricultural and Food Chemistry* **2023** 71 (36), 13554-13565 <https://doi.org/10.1021/acs.jafc.3c02031>
- Efficacy and Comparison of Different Strategies for Selenium Biofortification of Tomatoes. Shiriaev A, Pezzarossa B, Rosellini I, Malorgio F, Lampis S, Ippolito A, Tonutti P. *Horticulturae*. **2022**; 8(9):800. <https://doi.org/10.3390/horticulturae8090800>
- Se-Enrichment Pattern, Composition, and Aroma Profile of Ripe Tomatoes after Sodium Selenate Foliar Spraying Performed at Different Plant Developmental Stages. Meucci A, Shiriaev A, Rosellini I, Malorgio F, Pezzarossa B. *Plants*. **2021**; 10(6):1050. <https://doi.org/10.3390/plants10061050>
- Selenium enrichment of tomato plants with nanoparticles: improved fruit quality, physiological performance, and increased nutraceutical value. Shiriaev A., Pezzarossa B., Malorgio F., Tonutti P. *Acta Italus Hortus* 26, Catania, Italy, **2021**. ISSN 1127-3496
- Use of molecular markers to study pigment and antioxidant accumulation in tomato leaves and fruits. Ignatova S, Babak O, Solovyov A, Shiriaev A, Bagirova S. *XIX EUCARPIA Meeting of the Tomato Working Group*, Naples, Italy, **2018**.
- Russia's WTO accession: advantages and disadvantages. Agricultural aspects. Shiriaev A. *Economic development problems of Russian agro-industrial complex*, Moscow 2015, p 153, ISBN 978-5-94558-315-8 ([in Russian](#)).
- The impact of Russia's accession to the WTO on the development of agrarian policy. Shiriaev A. *Innovative development of socio-economic systems*, Ulyanovsk, Russia 2015, p 442-447, ISBN 978-5-9795-1388-1 ([in Russian](#)).
- Manuscript in progress:** Endophytes effects on hyper salinity stress in halophytes. Shiriaev A, Scartazza A, Debaccio D, Franchi E, Rosellini I, Petruzzelli G, Barbafieri M.

Privacy statement: I hereby authorize the processing of personal data contained in my curriculum vitae.

Pisa, September 20th, 2023