

Antonio Aguilar-Garrido

Environmental Scientist. PhD student

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About me

Antonio Aguilar-Garrido is a PhD student in the field of soil science. He holds a degree in Environmental Sciences and a master's degree in Conservation, Management and Restoration of Biodiversity, both from the University of Granada. Currently, he is pursuing a PhD in Earth Sciences at the [Department of Soil Science and Agricultural Chemistry](#) of the [University of Granada](#) under the supervision of Professor F. J. Martín Peinado (fjmartin@ugr.es), for which he received the Spanish government FPU research grant. During his PhD he carried out a short research stay at the [Linking Landscape, Environment, Agriculture and Food \(LEAF\)](#) research centre of the [Instituto Superior de Agronomía](#) in the [University of Lisbon](#) (Portugal). His research focuses on the generation of Technosols from urban, agricultural and mining wastes for the treatment of water and soils polluted by potentially harmful elements (PHEs) (e.g., As, Cu, Pb and Zn). His main interests are related to the fields of soil and water contamination/decontamination, mining restoration, toxicity assessment and circular economy. He has worked with the main analyses of soil properties, enzyme activities in soils and toxicological bioassays to evaluate the toxicity on soils of different PHEs. Furthermore, he has teaching experience in the subjects of "The physical environment", "Soil science", "Methods for the study of the natural environment" and "Soil evaluation, management, conservation, and recovery techniques" of the degrees in Biology and Environmental Sciences; and has mentored some final degree/master's degree projects. He has been involved in the Spanish Ministry of Science research project "Restoration of soils contaminated by heavy metals: A strategy based on waste revalorisation and bioremediation (RTI 2018-094327-B-I00)". Aguilar-Garrido is the first author of five academic articles, and co-author of four others, which have all been published in JCR-indexed journals. He is also author of six book chapters and has presented several posters and oral communications in conferences at national and international level. He has also collaborated as a reviewer in prestigious JCR-indexed journals such as *Science of the Total Environment*, *Environmental Geochemistry and Health*, and *Plant and Soil*.

Research topics: Soil Science, Environmental Sciences, Water, Contamination, Ecotoxicology, Potentially harmful elements (PHEs), Waste valorisation, Technosols, Toxicity assessment.

Personal data

Nationality: Spanish

Date and place of birth: 28/07/1995. Alfacar, Granada, Spain.

Current working position: Predoctoral Fellow / PhD student

Workplace: Department of Soil Science and Agricultural Chemistry. Faculty of Sciences. University of Granada. Spain.



Education

PhD in Earth Sciences.

Oct 2019 - Present

Department of Soil Science and Agricultural Chemistry. Faculty of Sciences. University of Granada. Spain.

Title: Waste-derived Technosols for the treatment of soils and waters affected by potentially harmful elements (PHEs).

Research area: Soil Science, Contamination.

Supervisor: Professor F. J. Martín Peinado.

Funding source: FPU contract by the Spanish Ministry of Education and Professional Training.

Master of Science in Conservation, Management and Restoration of Biodiversity.

Oct 2018 - Jul 2019

Faculty of Sciences. University of Granada. Spain.

Mark academic register: 9.21

Master's degree project title: Generation of Technosols for the decontamination of arsenic-contaminated waters. (Mark: 9.9/10).

Degree in Environmental Sciences.

Sep 2013 - Jan 2018

Faculty of Sciences. University of Granada. Spain.

Mark academic register: 8.545

Final degree's project title: Comparative study of the capacity of arsenic adsorption between the horizons of peat soil. (Mark: 10/10).

Experience

Predoctoral Fellow.

Oct 2019 - Oct 2023

Department of Soil Science and Agricultural Chemistry. Faculty of Sciences. University of Granada. Spain.

Funded by an FPU (Formación de Profesorado Universitario) contract from the Spanish Ministry of Science, Innovation and Universities, and supervised by Professor F. J. Martín Peinado (fjmartin@ugr.es). Conducting my thesis on soil/water decontamination by waste-derived Technosols and giving classes in laboratory, cabinet and field in some subjects of the degrees of Biology and Environmental Sciences.

PhD Short Stay.

Sep 2021 - Dec 2021

Research centre LEAF - Linking Landscape, Environment, Agriculture and Food. Instituto Superior de Agronomia. Universidade de Lisboa. Portugal.

Funded by a mobility grant of the University Teacher Training Program (FPU) of the Spanish Ministry of Universities, supervised by Professor M. M. Abreu (manuelaabreu@isa.ulisboa.pt) and involved in "Resource Management & Landscape Architecture" Research Group. Working on analysis of enzymatic activities in polluted soils treated with Technosols and the study of the evolution of the remediation process of mining waste and salinity-affected soils using Technosols in greenhouse experiments.

Trainee researcher.

May 2019 - Jul 2019

Food Chain Economics Area. Andalusian Institute for Research and Training in Agriculture, Fisheries, Food and Ecological Production (IFAPA). Junta de Andalucía. Granada. Spain.

Internships associated with the Master of Science in Conservation, Management and Restoration of Biodiversity under the supervision of Dr. S. Sayadi Gmada (samir.sayadi@juntadeandalucia.es). Researching the potential development of industrial hemp in Andalusia as part of the FINAICONST Task Force: Natural fibres for industry and construction.

Internal student.

Nov 2016 - Sep 2019

Department of Soil Science and Agricultural Chemistry. Faculty of Sciences. University of Granada. Spain.

During the realization of the final projects of degree and master's degree under the supervision of Dr. F. J. Martínez Garzón (fjgarzon@ugr.es), Dr. M. Sierra Aragón (msierra@ugr.es) and Dr. F. J. Martín Peinado (fjmartin@ugr.es). Conducting soil analysis and toxicological bioassays, as well as data processing. Also, developing different dissemination activities (workshops for students, congresses).

Teaching activity

Formal teaching

[Department of Soil Science and Agricultural Chemistry. University of Granada. Spain.](#)

Soil Science. Degree in Environmental Sciences (2° course).

Laboratory practices (soil analysis: sample treatment, pH, electrical conductivity, organic carbon, calcium carbonate content, texture, color, structure, exchangeable bases and cation exchange capacity, moisture, and useful water).

Assigned teaching hours: 20 hours (Academic year 2019/2020), 20 hours (Academic year 2020/2021), 60 hours (Academic year 2021/2022).

The physical environment. Degree in Biology (1° course).

Laboratory practices (soil analysis: sample treatment, pH, electrical conductivity, organic carbon, calcium carbonate content, texture, color, and structure).

Assigned teaching hours: 25 hours (Academic year 2019/2020), 25 hours (Academic year 2020/2021).

Soil evaluation, management, conservation, and restoration techniques. Degree in Environmental Sciences (3^o course).

Field practices (description of different recovery techniques for mining sites: erosion control, vegetation establishment, ...; and explanation of how to measure the concentration of potentially harmful elements at field by X-ray fluorescence) and computer-based practices on soil evaluation (USDA agrological classes, Riquier) and land use change assessment.

Assigned teaching hours: 8 hours (Academic year 2019/2020), 8 hours (Academic year 2020/2021).

Methods for the study of the natural environment. Degree in Biology (1^o course).

Soil mapping studies by cabinet practices (photointerpretation, analysis of the soil-forming factors and description of different types of soils) and field practices (natural environment and soil profiles description).

Assigned teaching hours: 7 hours (Academic year 2019/2020), 7 hours (Academic year 2020/2021).

Talks and courses

Talk. Aplicación de Tecnosoles derivados de residuos para el tratamiento de suelos y aguas afectados por minería. Feb 2021

Master' Degree in Conservation, Management and Restoration of Biodiversity. University of Granada.

Seminar given in the context of the subject "Soil Restoration" focused on the generation of Technosols from organic/inorganic waste for application in soil remediation and water treatment affected by PHEs (As, Pb, Sb, and Zn).

Supervision of student research (final degree/master's degree projects)

Mentoring

[Department of Soil Science and Agricultural Chemistry. University of Granada. Spain.](#)

Contribución de las áreas mineras recuperadas con Tecnosoles como sumideros de C. 2023-2024 (In process)

Author: Andrea González del Río

Tutors: Diego Arán (Inproyen Consulting) and Francisco José Martín Peinado (UGR)

Master's degree in Conservation, Management and Restoration of Biodiversity.

Evaluación de fitoextracción de elementos tecnológicamente críticos. 2022-2023 (In process)

Author: Jorge Fernández Garrido

Tutors: Ana Romero Freire and Francisco Javier Martínez Garzón

Master's degree in Conservation, Management and Restoration of Biodiversity. Mark: 9 (Defense: 20/09/2023)

Evaluación de Tecnosoles en la descontaminación de suelos y su influencia sobre la fitotoxicidad de metales pesados. 2022-2023

Author: Mateo González Quero

Tutors: Begoña Blasco León (Department of Plant Physiology - UGR) and Manuel Sierra Aragón (Department of Soil Science and Agricultural Chemistry - UGR)

Master's degree in Advances in Agricultural Biology and Aquaculture. Mark: 9.9 (Defense: 20/07/2023)

Uso de Tecnosoles en la recuperación de suelos contaminados por actividades mineras. 2021-2022

Author: Ignacio Montero Acosta

Tutors: Manuel Sierra Aragón and Ana Romero Freire

Master's degree in Conservation, Management and Restoration of Biodiversity. Mark: 9.7 (Defense: 20/07/2022).

Aplicación de Tecnosoles para la recuperación de suelos contaminados. 2020-2021

Author: Sheila Ocón Martín

Tutors: Francisco José Martín Peinado and Ana Romero Freire

Master's degree of Advances in Agricultural Biology and Aquaculture. Mark: 9.0 (Defense: 20/09/2021).

Grants and awards

Roland Schlich Travel Support of the European Geosciences Union 2022, 2023. May 2022, Apr 2023

Awarded by the European Geosciences Union (EGU) to participate on-site in its general assembly held in Vienna in 2022 and 2023, presenting some results of my research line.

2023: *Biological assessment of in-situ rehabilitation of polluted soils by waste-derived Technosols.*

2022: *Development capacity of a biodiverse pasture on Technosols for the rehabilitation of marginal lands (saline soils and mining waste).*

Mobility grant FPU. Mobility grant of the University Teacher Training Program. Sep 2021 - Dec 2021

Granted by the Spanish Ministry of Science, Innovation and Universities to carry out a short stay in the research centre LEAF - Linking Landscape, Environment, Agriculture and Food of the Instituto Superior de Agronomía in the University of Lisbon, and thus reinforce the internationalisation of their scientific training and technical capacity.

FPU. Formación de Profesorado Universitario contract. Oct 2019 - Present

Granted by the Spanish Ministry of Science, Innovation and Universities to pursue a doctoral thesis and at the same time acquire university teaching competencies.

End-of-degree award in Environmental Sciences. Academic year 2017/2018. Nov 2019

Awarded by the University of Granada (Spain).

Collaboration grant of the XXXII Reunión Nacional De Suelos. Funding on-site participation. Sep 2019

Awarded by the Spanish Society of Soil Sciences (SECS) to participate in the congress "XXXII REUNIÓN NACIONAL DE SUELOS (RENS 2019)" held in Seville, presenting some results of my research line.

Best Final Degree Project Award in Environmental Sciences of Andalusia of 2017. Jun 2018

Awarded by the Professional Association of Graduates in Environmental Sciences of Andalusia (COAMBA).

Collaboration grant in university departments. Oct 2016 - Jul 2017

Granted by the Spanish Ministry of Education, Culture and Sport to carry out the final degree project and getting started in scientific research.

Research projects

Restauración de suelos contaminados por metales pesados: Una estrategia basada en la revalorización de residuos y la biorremediación (RTI 2018-094327-B-I00). 2019-2021

Spanish national project (Call 2018 for R+D+i projects "Research challenges", of the State R+D+i program oriented to societal challenges). Funded by the Spanish Ministry of Science, Innovation and Universities.

Carried out by Estación Experimental del Zaidín- CSIC and Department of Soil Science and Agricultural Chemistry-UGR.

Principal researchers: Inmaculada García Romera and Francisco José Martín Peinado

Amount financed: 217.800,00 €

Team member

Training courses / Workshops

Teacher and researcher training

Introductory course of university teaching. University of Granada (Spain). Sep, Oct, Nov, Dec 2022

3rd edition of the 90-hour course for novice teachers from the Quality, Teaching Innovation and Prospective Unit to address topics related to teaching planning, teaching methodology, use of platforms and free software in teaching, teaching evaluation and personalised attention to students.

Creativity, integrity and communication in science. University of Granada (Spain). Jan 2022
30-hour course for researchers from the Centre of the Doctoral School of Sciences, Technologies and Engineering to foster creativity and analyses the process of generating new knowledge.

Scientific writing. University of Granada (Spain). Jun, Jul 2021
30-hour course for researchers from the Centre for Modern Languages to provide a practical introduction to the use of written English in the international academic context, with particular attention to the writing of clear and attractive academic texts (doctoral theses, paper proceedings, articles, etc.).

English for academic purposes. University of Granada (Spain). Apr, May, Jun 2021
40-hour course for teachers and researchers from the Quality, Teaching Innovation and Prospective Unit to learn how to participate in international networks in which English is used; to develop specific skills to attend congresses, conferences, etc., and to be able to use English as a vehicle for the transmission of our work and research; to work on written skills for the preparation of papers and articles.

Scientific career and project development projects. University of Granada (Spain). Mar 2021
6-hour course for researchers from the International Postgraduate School and the Vice-Rectorate for Research and Transfer, focused on the scientific career, pre/postdoctoral calls, research projects and their evaluation.

"PRADO" teaching support resource platform. University of Granada (Spain). Feb, Mar 2021
40-hour course for teachers from the Quality, Teaching Innovation and Prospective Unit to learn about the basic concepts, tools and characteristics of the teaching support resource platform "PRADO" used in the University of Granada.

Innovation by playing with creative thinking. University of Granada (Spain). Feb 2021
2-hour workshop for researchers from the Office for Transfer of Research Results, focused on stimulate researcher creativity to generate innovative ideas and projects aimed at responding to socio-economic challenges and current market demands. As well as to transmit them in teaching.

Attracting the attention and motivation of university students. University of Granada (Spain). Jun 2020
20-hour course for teachers from the Quality, Teaching Innovation and Prospective Unit, focused on the study of different techniques to attract the attention and motivation of students to increase the quality of the teaching discourse.

IV Conference on Introduction to University Teaching for Contracted FPU and FPI Predoctoral. Nov 2019
University of Granada (Spain).
20-hour training activity for teachers from the Quality, Teaching Innovation and Prospective Unit, which dealt with various topics related to teaching such as the rights and duties of teachers, planning, and evaluation by competencies, teaching innovation methodologies and projects, the use of teaching platforms, guidance and attention to students.

Landcare for the Future. The meeting point for educators and students. Jul 2018
University of Santiago de Compostela (Spain).
24-hour Erasmus + Landcare Project course and conference held in Santiago de Compostela (Spain) focused on improving educational and training capabilities concerning Ecological Restoration. Education and training pathways related to global environmental threats (forest fires, soil and water pollution, degradation of wetland and coastal ecosystems and overexploitation of agricultural and forest landscapes) and the application of innovative technologies and tools in education to improve employability and entrepreneurship were discussed.

[Software tools](#)

Writing scientific texts using LaTeX and version control with Git. University of Granada (Spain). Mar 2021
20-hour course from the International Postgraduate School, focused on the writing of the doctoral thesis. Specifically, how to use LaTeX to write scientific texts, the automatic handling of the bibliography, and how to generate documents in different formats from the source code. As well as the use of the Git version control system, of special interest for the administration of collaborative work, such as the joint writing of research articles or the corrections of the doctoral thesis.

Basic statistical techniques applied in Experimental Sciences: fundamentals, interpretation and implementation in R. University of Granada (Spain). Feb 2021

Training activity of the International Postgraduate School of 20 hours to learn about the application of numerous probabilistic-statistical techniques and methods in many fields of application (general principles of inference, categorical data analysis, models of regression and multivariate analysis techniques).

Introduction to Python: Language basics. University of Granada (Spain). Feb, Mar 2020

Training activity of the International Postgraduate School of 20 hours to learn the basic concepts of Python language (handling of variables, lists, tuples and dictionaries, if/for flow tools, creation of own functions, etc.).

Introduction to statistical analysis in scientific research with RSTUDIO (3rd edition). Jul, Aug 2018

Darwin Eventur Association. Faculty of Sciences. University of Granada (Spain)

100-hour online course focused on learning the R language to do statistical analysis (R installation, data manipulation with R Commander, orders of R, measures of position, dispersion and shape of a data set, graphical representations, contingency tables and probability distributions, test contrasting hypothesis and correlations, and linear regression).

Functionalities of GIS with QGIS. ECOPERÚ Proyectos y Soluciones Ambientales S.A.C. May, Jun 2018

A 100-hour online course focused on learning how to use geographic information systems. Specifically, how to create interactive queries, analyses spatial information (vegetation, topography, natural phenomena, etc.), edit environmental data, maps and present the results of all these operations.

[Laboratory techniques](#)

Biosafety and chemical risks in teaching and research. Identification and prevention measures. Jan 2023

University of Granada (Spain).

Training activity of the Quality, Teaching Innovation and Prospective Unit of 20 hours to gain general knowledge on safety in teaching and research (identification of risks due to the use of biological agents and/or chemical agents, containment levels of laboratories, preventive and protective measures, and European regulations).

Management of urban and hazardous waste in the departments of the University of Granada. Apr 2021

University of Granada (Spain).

Basic 6-hour training seminar from the Quality, Teaching Innovation and Prospective Unit, focused on urban, urban-assimilable, special and hazardous waste associated with teaching and research activities at the University of Granada.

Radiation protection for teaching and research activities (4th edition). Sep, Nov, Dec 2018

University of Granada (Spain).

Training activity of the Radiation Protection Service of 80 hours to have the necessary knowledge of radiological protection to be able to use certain analysis instruments such as X-ray fluorescence instrument.

Advances in the methods of soils and plant analysis (4th edition). Jun 2017

International University of Andalusia (UNIA) (Spain).

25-hour theoretical-practical course held in Baeza (Jaen, Spain) organized by the Department of Soil Science and Agricultural Chemistry of Granada University. It focuses on learning techniques of analysis and interpretation of soils and plant material, as well as other eminent practices related to sampling, basic analysis, and interpretation of results.

[Technical knowledge](#)

Training school "New approaches in mine reclamation: linking geomorphology with soil and vegetation management". European Cooperation in Science and Technology (COST). Jul 2022

COST Action - Training school of 35 hours organized by PEN-CAFoRR (CA19128): Pan-European Network for Climate Adaptive Forest Restoration and Reforestation. Course that combines classroom and field sessions along mines in Spain about new trends in mine reclamation, from geomorphic reclamation to innovative strategies and techniques for improving vegetation establishment and soil erosion control under challenging conditions of opencast mining.

How to work with ecotoxicology data - hands on course. University of Aveiro (Portugal). Jul 2021

Online course of around 35 hours organized by Centro de Estudos do Ambiente e do Mar (CESAM) and the Department of Biology of the University of Aveiro, which offered training on ecotoxicology data analysis: exposure, hazard, mixtures, bioaccumulation, toxicokinetic, from the basic principles towards multivariate data analysis and modelling (dose-response curves, species sensitivity distribution, mixture toxicity and multiple stressors, etc.).

XLIII Summer School Earth Sciences: Soil Degradation and Remediation.

Jul 2021

Autonomous University of Madrid (Spain).

Online course of around 25 hours, which offered a multidisciplinary point of view with real experiences and cases of soil degradation due to mining and agricultural activities (heavy metals, Hg, pesticides, organic contaminants, erosion, etc.), remediation techniques and methods (fitotechnologies, bioremediation, organic amendments, etc.) to prevent the impact of these activities.

A Circular Economy of Metals: Towards a Sustainable Societal Metabolism.

Apr, May 2020

Leiden University (Netherlands).

Online course (Coursera) of around 40 hours, which explored the consequences of metal production and options for moving towards a more sustainable system of metal production and use. It focused particularly on options for achieving a circular economy of metals: keeping metals in use for a very long time, to avoid having to mine new ones.

Circular Economy: An introduction. Delftx - Delft University of Technology (Netherlands).

Apr 2020

Online course (Edx platform) centered on the circular economy and the zero-waste concept of around 30 hours. Exploring the concepts of business value, longer lasting products, remanufacturing, waste equals food and giving back, among others.

Field Edaphology Course and Field Soil Interpretation Contest. University of Lérida (Spain).

July 2019

A theoretical-practical course of Field Soil Science of 36 hours held in Tremp (Lérida) focused on the soil interpretation from landscapes to profiles. It also included a team soil interpretation contest, in which our team came in third in the general classification.

SOILSx. As above, so below: An introduction to soils, ecosystems, and livelihoods in the tropics.

May, Jun 2019

KU Leuven University (Belgium).

Online course (Edx platform) of 30 hours focused on the importance, properties, and management of soils in the tropics and the world generally. Overview of the main soil groups (Andosol, Calcisol, Cambisol, Ferralsol, Luvisol, Regosol, Phaozem, Solonetz, Vertisol, etc.).

Soil and Groundwater Contamination. Instituto Superior del Medio Ambiente (ISM) (Spain).

May, Jun 2018

80-hour online course dedicated to the diagnostic tools needed to assess the quality of contaminated soil and groundwater, sampling strategies and techniques, basic concepts for applying the methodology of quantitative risk analysis (QRA), and the main technologies available for the remediation of contaminated soil and groundwater.

Biotechnological applications of microbial interactions with heavy metal. University of Granada (Spain).

Jul 2016

A 45-hour course of the Mediterranean Center of the University of Granada focused on the study of the biochemical and microbiological foundations of microbial interactions with metals, and the properties that microorganisms with potential in metal-related biotechnological processes, such as bioremediation, should possess.

Soil Science in advance. University of Granada (Spain).

Jun 2015

Course organized by the research group of soil science and geopharmacy of the Department of Soil Science and Agricultural Chemistry of 15 hours, in which it is deepened in diverse topics related to soil science (soil erosion control, soil affected by fire, nutritional requirements of olive groves, soils and health, soil contamination/decontamination, ...).

Water resources: Problems and actions for their protection. Darwin Eventur Association.

Feb 2015

A 25-hour course focused on different problems affecting water resources (overexploitation of aquifers, water contamination, nitrification, ...), as well as on different potential solutions to these (bioremediation, riverside vegetation restoration, biofilm systems, wetland restoration, ...).

[Workshops](#)**Researchers in Training Conference. Fostering Interdisciplinarity (JIFFI).** University of Granada (Spain).

Nov 2020

Attendance at the round tables of "How to present your thesis idea", "How to deal with the post-thesis period" and "New and old challenges facing research" of around 5 hours organized by the International Postgraduate School.

UNESCO Biosphere Reserves. University of Granada (Spain).

Nov 2018

Extraordinary academic activity of 30 hours in the Master of Science in Conservation, Management and Restoration of Biodiversity taught by Ph.D. Michel S. Adams (University of Wisconsin - Madison) focused on the figure of protection of natural spaces of Biosphere Reserves.

I Conference of Environmental Toxicology at the UGR. University of Granada (Spain). Apr 2018

Training activity of the General Foundation UGR-Company of 25 hours focused on different issues in the field of Environmental Toxicology (toxicological risk assessment, biomonitoring of environmental pollutants, and environmental and human health problems arising from the use of pesticides).

The mountain, a multidisciplinary and timeless vision of the Sierra Nevada. Mar 2018

University of Granada (Spain).

University course of 75 hours included in the I International Mountain Congress, Sierra Nevada 2018 (CIMAS) organized by the University of Granada, marked by an outstanding multidisciplinary character to make development and conservation of mountains compatible.

Scientific - Technical experience

[Methodologies and scientific instruments](#)

Soil sampling and interpretation in the field.

- ☞ Sampling of agricultural and forest soils, and soils polluted by metal(loid)s (e.g., As, Cd, Cu, Sb, Pb, Zn).
- ☞ Description of soil profiles (landscape, soil components, soil-forming factors, pedogenic processes, pedogenic features, etc.) according to the Guide for the description of soil profiles (FAO, 2009).
- ☞ Classification of soils according to the global reference base of the soil resource 2014, Update 2015 (Working Group IUSS WRB, 2015).
- ☞ Soil monoliths sampling for museum displays.

Soil chemistry.

- ☞ Analysis of physical, chemical and physicochemical soil properties according to official analysis methods of the Spanish Ministry of Agriculture, Fishing and Food (1986).
- ☞ Enzyme activity in soils: dehydrogenase (Tabatabai, 1994), urease (Kandeler and Gerber, 1988), acid phosphatase (Eivazi and Tabatabai, 1977), cellulase (Hope & Burns, 1987), protease (Ladd & Butler, 1972), sulfatase (Tabatabai, 1994; Dick et al., 1996), and β -glucosidase (Eivazi and Tabatabai, 1988).

Analytical chemistry.

- ☞ Elemental analysis by ion chromatography (Dionex DX-120 chromatograph).
- ☞ Determination of the concentration of trace elements and heavy metals/metalloids by X-ray fluorescence (NITON XLt 792 XRF analyser).
- ☞ Acid digestion for vegetable and soil samples by combined pressure-temperature (Microwave XP1500 Plus) or temperature (Sample Preparation Block Perkin Elmer) method.
- ☞ Analysis of trace elements and metal(loid)s in soils and plants by inductively coupled plasma optical emission spectroscopy (ICP-OES Avio® 500, Perkin Elmer) and atomic absorption spectrometry (SpectrAA 220FS Varian).

Ecotoxicology.

- ☞ Toxicological bioassays for the evaluation of environmental risks.
 - * Seed germination/root elongation of *Lactuca sativa* L. (OECD, 2003; US EPA, 1996).
 - * Soil carbon transformation rate: Measurement of the basal and induced heterotrophic respiration by a microbiological analyser-trac 4200 SY-LAB® (ISO 17155, 2002), the microbial biomass using the irradiation/incubation method (Ferreira et al., 1999) and the metabolic quotient (Anderson and Domsch, 1993).
 - * Microcosms assays with different plant species (*Trifolium pratense* L., *Hordeum vulgare* L., ...): filter paper test (Salvatore et al., 2008), hydroponic test (Santos et al., 2013), and soil test (ISO 15799, 1999; Martí et al., 2007).
 - * Survival and bioaccumulation of potentially harmful elements in *Eisenia andrei* (OECD, 1984; OECD, 2010).

Computer skills

Desktop publishing: Microsoft Office ***, LibreOffice ***, Google Docs ***, LaTeX (Overleaf) *, BibTeX *, Inkscape *, Adobe Photoshop *, IrfanView *.

Programming languages: Python *, R **.

Statistical software: SPSS ***, R Studio ***, R Commander ***, SigmaPlot *, ETX *, PRIMER *.

Geographic information systems (SIGs): ArcGIS **, QGIS **

Reference manager: Mendeley ***, Zotero *.

Others: Git *, Turnitin ***.

Note: Level = *** High, ** Medium, * Low

Languages

Mother tongue **Spanish**

Other languages	Understanding		Speaking		Writing	Certifications
	Listening	Reading	Interaction	Production		
English	C1 Fluent	C1 Fluent	B2 Intermediate	B2 Intermediate	B2 Intermediate	First Certificate in English (B2), Cambridge University, 2019
Portuguese	B1 Basic	B1 Basic	B1 Basic	B1 Basic	B1 Basic	Diploma Elementar de Português Língua Estrangeira (B1 - DEPLE), Centro de Avaliação e Certificação de Português Língua Estrangeira (CAPLE), 2022

Publications

Journal papers

- [1] **Aguilar-Garrido, Antonio**; Romero-Freire, Ana; Paniagua-López, Mario; Martínez-Garzón, Francisco Javier; Martín-Peinado, Francisco José; Sierra-Aragón, Manuel. (2023). **Technosols Derived from Mining, Urban, and Agro-Industrial Waste for the Remediation of Metal(loid)-Polluted Soils: A Microcosm Assay**. *Toxics*, 11(10):854. doi: [10.3390/toxics11100854](https://doi.org/10.3390/toxics11100854)
JIF (2022): 4.6 (Q1) (Toxicology)
- [2] **Aguilar-Garrido, A.**; Paniagua-López, M.; Sierra-Aragón, M.; Martínez Garzón, F. J.; Martín-Peinado, F. J. (2023). **Remediation potential of mining, agro-industrial, and urban wastes against acid mine drainage**. *Scientific Reports*, 13:12120. doi: [10.1038/s41598-023-39266-4](https://doi.org/10.1038/s41598-023-39266-4)
JIF (2022): 4.600 (Q2) (Multidisciplinary Sciences)
- [3] **Aguilar-Garrido, Antonio**; Reyes-Martín, Marino Pedro; Vidigal, Patrícia; Abreu, Maria Manuela. (2023). **A green solution for the rehabilitation of lands: the case of *Lablab purpureus* (L.) Sweet grown in Technosols**. *Plants*, 12(14):2682. doi: [10.3390/plants12142682](https://doi.org/10.3390/plants12142682)
JIF (2022): 4.500 (Q1) (Plant Sciences)
- [4] Pereira Melloni, Eliane Guimaraes; Melloni, Rogerio; Pastor-Jáuregui, Rocío; **Aguilar-Garrido, Antonio**; Martín Peinado, Francisco José. (2023). **Microbiological indicators as sensitive indicators in the assessment of areas contaminated by heavy metals**. *Soil Research*, 61(7):663-673. doi: [10.1071/SR23012](https://doi.org/10.1071/SR23012)
JIF (2022): 1.6 (Q4) (Soil Science)

- [5] Paniagua-López, Mario; **Aguilar-Garrido, Antonio**; Contero-Hurtado, José; García-Romera, Inmaculada; Sierra-Aragón, Manuel; Romero-Freire, Ana. (2023). **Ecotoxicological Assessment of Polluted Soils One Year after the Application of Different Soil Remediation Techniques**. *Toxics*, 11(4):298. doi: [10.3390/toxics11040298](https://doi.org/10.3390/toxics11040298)
JIF (2022): 4.6 (Q1) (Toxicology)
- [6] **Aguilar-Garrido, Antonio**; Paniagua-López, Mario; Romero-Freire, Ana; Martínez Garzón, Francisco Javier; Fernández Ondoño, Emilia; Martín Peinado, Francisco José. (2022). **Short-term evolution of physico-chemical properties of Technosols made from contaminated soils by pyritic sludge**. *Revista de Ciências Agrárias*, 45(4):627-631. doi: [10.19084/rca.28744](https://doi.org/10.19084/rca.28744)
Journal of Sociedade de Ciências Agrárias de Portugal (not indexed in JCR).
- [7] Paniagua-López, Mario; García-Robles, Helena; **Aguilar-Garrido, Antonio**; Romero-Freire, Ana; Lorite, Juan; Sierra-Aragón, Manuel. (2022). **Soil and vegetation recovery in an area affected by residual pollution after remediation measures**. *Revista de Ciências Agrárias*, 45(4):726-730. doi: [10.19084/rca.28864](https://doi.org/10.19084/rca.28864)
Journal of Sociedade de Ciências Agrárias de Portugal (not indexed in JCR).
- [8] Pastor-Jáuregui, Rocío; Paniagua-López, Mario; **Aguilar-Garrido, Antonio**; Martínez-Garzón, Francisco Javier; Romero-Freire, Ana; Sierra-Aragón, Manuel. (2022). **Ecotoxicological risk assessment in soils contaminated by Pb and As years after a mining spill**. *Journal of Contaminant Hydrology*, 251:104100. doi: [10.1016/j.jconhyd.2022.104100](https://doi.org/10.1016/j.jconhyd.2022.104100)
JIF (2022): 3.600 (Q2) (Environmental Sciences)
- [9] **Aguilar-Garrido, Antonio**; García-Carmona, Minerva; Sierra Aragón, Manuel; Martín Peinado, Francisco José; Martínez Garzón, Francisco Javier. (2022). **Carbonated waste valorisation from a peat bog exploitation in the treatment of arsenic-polluted waters**. *International Journal of Environmental Science and Technology*, 19, 3457-3468. doi: [10.1007/s13762-021-03445-5](https://doi.org/10.1007/s13762-021-03445-5)
JIF (2022): 3.100 (Q3) (Environmental Sciences)
- [10] Pastor-Jáuregui, Rocío; Paniagua-López, Mario; **Aguilar-Garrido, Antonio**; Martín-Peinado, Francisco José; Sierra-Aragón, Manuel. (2021). **Long-term assessment of remediation treatments applied to an area affected by a mining spill**. *Land Degradation & Development*, 32(18), 2481-2492. doi: [10.1002/ldr.3911](https://doi.org/10.1002/ldr.3911)
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- [11] **Aguilar-Garrido, A.**; Romero-Freire, A.; García-Carmona, M.; Martín Peinado, F.J.; Sierra Aragón, M.; Martínez Garzón, F.J. (2020). **Arsenic Fixation in Polluted Soils by Peat Applications**. *Minerals*, 10(11), 968. doi: [10.3390/min10110968](https://doi.org/10.3390/min10110968)
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Book chapters

- [1] **Aguilar-Garrido, A.**; Paniagua-López, M.; Martínez Garzón, F. J.; Martín Peinado, F. J. (2023). **Evaluación de la efectividad de Tecnosoles en la recuperación de suelos contaminados y el establecimiento de vegetación espontánea**. In Arricibita Videgain et al. (eds.). *Libro de Actas de la XXXIII Reunión Nacional de Suelos de la Sociedad Española de la Ciencia del Suelo* (pp. 18-19). Pamplona, Spain (September 2023): XXXIII Reunión Nacional de Suelos. ISBN 978-84-9769-395-0 [[Chapter](#)]
* Poster presented in XXXIII Reunión Nacional de Suelos (RENS23). [[Poster](#)]
- [2] Paniagua-López, M.; **Aguilar-Garrido, A.**; Martínez-Garzón, F. J.; Martín-Peinado, F. J.; Sierra-Aragón, M.; Romero-Freire, A. (2023). **Riesgos ambientales debido a la contaminación por gadolinio en suelos con cultivos de regadío**. In Arricibita Videgain et al. (eds.). *Libro de Actas de la XXXIII Reunión Nacional de Suelos de la Sociedad Española de la Ciencia del Suelo* (pp. 108-109). Pamplona, Spain (September 2023): XXXIII Reunión Nacional de Suelos. ISBN 978-84-9769-395-0 [[Chapter](#)]
* Poster presented in XXXIII Reunión Nacional de Suelos (RENS23).
- [3] **Aguilar-Garrido, Antonio**; Martínez Garzón, Francisco Javier; Paniagua-López, Mario; Sierra Aragón, Manuel; Martín Peinado, Francisco José. (2021). **Technosols made from organic/inorganic wastes for soil remediation: A microcosm assay**. In Pereira et al. (eds.). *Solos e Desenvolvimento Sustentável. Desafios e Soluções* (pp. 255-256). Porto, Portugal: Universidade do Porto Press. ISBN 978-989-746-313-6. [[Chapter](#)]

* Poster presented in Congresso Ibérico "Solo e Desenvolvimento Sustentável: Desafios e Soluções" (CISDS21).
[Poster]

- [4] **Aguilar Garrido, Antonio**; Martín Peinado, Francisco José; Sierra Aragón, Manuel; Martínez Garzón, Francisco Javier. (2021). **Efectos sobre la capacidad de adsorción y la toxicidad del arsénico de estériles de mina ricos en óxidos de hierro**. In Almendro Candel, M.B. and Jordán Vidal, M.M. (eds.). *El suelo: Clave para una gestión ambiental sostenible en un escenario de cambio global. Libro de resúmenes del IX Simposio Nacional sobre el Control de la Degradación y Recuperación de Suelos* (pp. 507-510). Elche, Spain: IX Simposio Nacional sobre Control de la Degradación y Recuperación de Suelos. ISBN 978-84-18177-09-5. [Chapter]

* Oral communication presented in IX Simposio Nacional sobre Control de la Degradación y Recuperación de Suelos.
[Oral Presentation]

- [5] **Aguilar, Antonio.**; Rodríguez, Carmen Rocío; Chayah, Meriem; Sayadi, Samir. (2019). **Natural fibers in Andalusia: Potential development of industrial hemp**. In Centro de Investigaciones en Agrosistemas Intensivos Mediterráneos y Biotecnología Agroalimentaria (CIAIMBITAL) & Universidad de Almería (UAL) (eds.). *Libro de actas del II Congreso de Jóvenes Investigadores en Ciencias Agroalimentarias* (pp. 239). Almería, Spain: II Congreso de Jóvenes Investigadores en Ciencias Agroalimentarias. ISBN 978-84-09-17547-5. [Chapter]

* Poster presented in II Congreso de Jóvenes Investigadores en Ciencias Agroalimentarias (CIAIMBITAL).
[Poster]

- [6] Martínez, F. J.; **Aguilar, A.**; García, M.; Martín, F. J. (2018). **Comparative study of the capacity of arsenic adsorption between the horizons of a peatland soil**. In Sociedad Española de la Ciencia del Suelo (SECS) (ed.). *Libro de Resúmenes del VIII Congreso Ibérico de las Ciencias del Suelo* (pp. 355-358). Donostia / San Sebastián, Spain: VIII Congreso Ibérico de las Ciencias del Suelo. ISBN 978-84-09-02936-5. [Chapter]

* Poster presented in VIII Congreso Ibérico de las Ciencias del Suelo (CICS2018).
[Poster]

Conference communications

- [1] **Aguilar-Garrido, A.**; Paniagua-López, M.; Sierra-Aragón, M.; Martínez Garzón, F. J.; Romero-Freire, A.; and Martín-Peinado, F. J. (2023). **Soil Enzyme Activity in Polluted Soils Treated With Waste-derived Technosols**. SETAC Europe 33rd Annual Meeting, Dublin, Ireland + Online, 30 April - 4 May 2023. 4.04.P-Th260. *

[Paper, Poster]

- [2] Abreu, M. M.; **Aguilar-Garrido, A.**; Vidigal, P.; and Caperta, A. D. (2023). **Improvement of physical, chemical and biological properties of saline soils and gossan waste through integrated biotechnological approach: Technosols and pasture development**. EGU General Assembly 2023, Vienna, Austria, 23-28 April 2023, EGU23-10077, doi: [10.5194/egusphere-egu23-10077](https://doi.org/10.5194/egusphere-egu23-10077) *

[Paper, Poster]

- [3] **Aguilar-Garrido, A.**; Paniagua-López, M.; Romero-Freire, A.; Sierra-Aragón, M.; Martínez Garzón, F. J.; and Martín-Peinado, F. J. (2023). **Biological assessment of in-situ rehabilitation of polluted soils by waste-derived Technosols**. EGU General Assembly 2023, Vienna, Austria, 23-28 April 2023, EGU23-226, doi: [10.5194/egusphere-egu23-226](https://doi.org/10.5194/egusphere-egu23-226) **

[Paper, Oral Presentation]

- [4] **Aguilar-Garrido, A.**; Paniagua-López, M.; Romero-Freire, A.; Martínez Garzón, F. J.; Fernández Ondoño, E.; and Martín-Peinado, F. J. (2022). **Short-term evolution of physico-chemical properties of Technosols made from contaminated soils by pyritic sludge**. In Sociedade Portuguesa da Ciência do Solo (SPCS) (eds.). *Comunicações do IX Congresso Ibérico das Ciências do Solo. O solo, recurso estratégico para uma sociedade sustentável* (pp. 486-489). Oeiras-Lisbon, Portugal (22-24 June 2022): IX Congresso Ibérico das Ciências do Solo. *

[Paper, Poster]

- [5] Paniagua-López, M.; García-Robles, H.; **Aguilar-Garrido, A.**; Romero-Freire, A.; Lorite, J.; and Sierra-Aragón, M. (2022). **Soil and vegetation in an area affected by residual pollution after remediation measures**. In Sociedade Portuguesa da Ciência do Solo (SPCS) (eds.). *Comunicações do IX Congresso Ibérico das Ciências do Solo. O solo,*

recurso estratégico para uma sociedade sustentável (pp. 518-521). Oeiras-Lisbon, Portugal (22-24 June 2022): IX Congresso Ibérico das Ciências do Solo. *

[Paper]

- [6] **Aguilar-Garrido, A.**; Vidigal, P.; Caperta, A. D.; and Abreu, M. M. (2022). **Development capacity of a biodiverse pasture on Technosols for the rehabilitation of marginal lands (saline soils and mining waste)**. EGU General Assembly 2022, Vienna, Austria, 23-27 May 2022, EGU22-121, doi: [10.5194/egusphere-egu22-121](https://doi.org/10.5194/egusphere-egu22-121) **

[Paper, Oral Presentation]

- [7] **Aguilar-Garrido, A.**; Romero-Freire, A.; Paniagua-López, M.; Martínez Garzón, F. J.; and Martín-Peinado, F. J. (2022). **Changes in the solubility and potential toxicity of metal(loid)s in soils treated with Technosols**. EGU General Assembly 2022, Vienna, Austria, 23-27 May 2022, EGU22-8337, doi: [10.5194/egusphere-egu22-8337](https://doi.org/10.5194/egusphere-egu22-8337) **

[Paper, Oral Presentation]

- [8] Paniagua-López, M.; Pastor-Jáuregui, R.; **Aguilar-Garrido, A.**; Romero-Freire, A.; and Sierra-Aragón, M. (2022). **Ecotoxicological risk assessment of the Guadiamar Green Corridor soils 20 years after the Aznalcóllar mining accident**. EGU General Assembly 2022, Vienna, Austria, 23-27 May 2022, EGU22-12397, doi: [10.5194/egusphere-egu22-12397](https://doi.org/10.5194/egusphere-egu22-12397) **

[Paper]

- [9] **Aguilar-Garrido, A.**; Martínez Garzón, F. J.; Paniagua-López, M.; Sierra Aragón, M.; Fernández Ondoño, E.; Martín Peinado, F. J. (2021). **Potential of mining, agro-industrial, and urban wastes for the remediation of acidic mine water**. EGU General Assembly 2021, online, 19-30 April 2021, EGU21-7093, doi: [10.5194/egusphere-egu21-7093](https://doi.org/10.5194/egusphere-egu21-7093) **

[Paper, Oral Presentation]

- [10] Pastor-Jáuregui, R.; **Aguilar-Garrido, A.**; Martín-Peinado, F. J.; Sierra-Aragón, M. (2019). **Mobility of potentially harmful elements in soils affected by residual contamination**. In Sociedad Española de la Ciencia del Suelo (SECS) (eds.). *Libro de Resúmenes de la XXXII Reunión Nacional de Suelos* (pp. 8-9). Sevilla, Spain (September 2019): XXXII Reunión Nacional de Suelos. *

[Paper, Poster]

- [11] **Aguilar-Garrido, A.**; Martín-Peinado, F. J.; Sierra-Aragón, M.; García-Carmona, M.; Martínez-Garzón, F. J. (2019). **Decontamination of waters with arsenic through peat waste**. In Sociedad Española de la Ciencia del Suelo (SECS) (eds.). *Libro de Resúmenes de la XXXII Reunión Nacional de Suelos* (pp. 10). Sevilla, Spain (September 2019): XXXII Reunión Nacional de Suelos. ***

[Paper, Oral presentation, Poster]

- [12] Martínez, Fco. Javier.; **Aguilar, Antonio.**; García, Minerva.; Martín, Fco. José. (2018). **Toxicological Bioassays to Evaluate the Effectiveness of a Decontamination Technique for Arsenic Contaminated Waters**. In *Landcare for the future: Book of abstracts* (pp. 43). Santiago de Compostela, Spain (July 2018): Landcare for the future. **

[Paper, Oral presentation]

Note: * Poster presentation, ** Oral presentation, *** Poster and Oral presentation

Bibliometric indexes

Source	Citations	h - index
Web of Science	14	2
Scopus	15	2
Google Scholar	25	3
ResearchGate	33	3

Reviewer experience

Journal	Number of articles reviewed
Science of the Total Environment (Elsevier)	3
Plant and Soil (Springer)	1
Environmental Geochemistry and Health (Springer)	1

Organization of R&D activities

Session SSS7.7 - Challenges and solutions for assessment, prevention and mitigation of contamination of urban soils and mines as ecotoxicological and human health risks.

Apr 2023

EGU General Assembly 2023.

Participation as co-convener in the set-up, management and running of this session within the General Assembly of the European Geosciences Union of 2023 held in Vienna (Austria). With 25 abstracts presented in person or virtually by authors from all over the world.

<https://meetingorganizer.copernicus.org/EGU23/session/46076>

Session SSS7.4/BG2.10/GI2.7 - Innovative and holistic approaches to prevent, assess and mitigate soil pollution: integrating natural solutions with advanced data analysis and digital tools.

May 2022

EGU General Assembly 2022.

Participation as co-convener in the set-up, management and running of this session within the General Assembly of the European Geosciences Union of 2022 held in Vienna (Austria). With 14 abstracts presented in person or virtually by authors from all over the world.

<https://meetingorganizer.copernicus.org/EGU22/session/42321>

XXXII National Meeting of Soils. Spanish Society of Soil Science (SECS).

Sep 2019

Assistance in the preparation of the XXXII National Meeting of Soils (documentation organization, accreditation of participants, preparation sessions, ...) held in Seville and organized by the University of Seville and Institute of Natural Resources and Agrobiological Sciences (IRNAS - CSIC).

Scientific dissemination activities

Arqus Challenge-Based Learning Programme "Rethinking Climate Change" - Pretraining.

Nov 2020

Arqus European University Alliance

Conducting the activity "Soil: the great unknown in the fight against climate change" within the programme of activities given to the students of the University of Granada selected in the Arqus Challenge-Based Learning Programme "Rethinking Climate Change" as support training.

European Researchers' Night. Marie Skłodowska-Curie Actions. European Commission.

Sep 2018, 2019, 2021

Collaboration in the activities "Discovering the world of the soil" and "Soil and Climate Change" for all audiences carried out in Granada and organized by the Department of Soil Science and Agricultural Chemistry of the University of Granada.

Sciences Week in Andalusia. Andalusia government.

Nov 2017, 2018, 2019, 2022, 2023

Conducting the activity "With your feet on the soil" for high school and college students carried out in the Faculty of Sciences of the University of Granada and organized by the Department of Soil Science and Agricultural Chemistry of the University of Granada.

Membership of scientific societies and associations

European Geosciences Union (EGU)

Jan 2021 - Present

Sociedad Española de la Ciencia del Suelo (SECS).

Apr 2017 - Present

Professional Association of Graduates in Environmental Sciences of Andalusia (COAMBA).

Dec 2017 - Dec 2019