

Maryam CHELKHA

Postdoctoral Associate

Soil Invertebrate and Ecosystem
Ecology

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EDUCATION

Mohammed V University 2017-2022

Ph.D. Soil Ecology and Biodiversity

Entitled “Biological interactions between earthworms and rhizosphere components associated with biocontrol (nematodes and fungi)”

Mention: **Very honorable**

Advisors:

Dr. Raquel CAMPOS-HERRERA, Institute of Vine and Wine Sciences, CSIC- University of La Rioja, Logroño, SPAIN

Pr. Souad AMGHAR, High Normal School, Mohammed V University, Rabat

Jury:

- **Pr. Larry DUNCAN**, Institute of Food and Agricultural Sciences, University of FLORIDA, USA.
- **Pr. Oumnia HIMMI**, Scientific Institute, Mohammed V University, Rabat.
- **Pr. Mohamed RAHOUTI**, Faculty of Sciences, Mohammed V University, Rabat.
- **Pr. Driss BELGHYTI**, Faculty of Sciences, Ibn Tofail University, Kenitra

<https://www.icvv.es/maryam-chelkha-estudiante-del-icvv-dentro-del-programa-i-coop-2018-doctora-por-la-universidad>

IBN TOFAIL University 2013-2015

Specialized master's degree: Functional Agro-Resources.

IBN TOFAIL University 2009-2013

Bachelor of fundamental study life sciences: Plant and microbial biotechnology

EXPERIENCES

Department of Entomology, Cornell University, Cornell AgriTech, Geneva NY, USA
starting 15/08/2023 Currently employed until 30/07/2023

Postdoctoral Associate: Soil Invertebrate and Ecosystem Ecology

Turfgrass management, C and N storage, Vibration, Earthworm management.

The Institute of Vine and Wine Sciences (ICVV), Logroño, Spain. 22/02/2021-21/08/2021

Research assistant: IN-vid (Agroecological innovation of the vineyard)

Objectives: as part of the CSIC ICOOP+ project, we investigate whether earthworms or their mucus can generate Induced Systemic Resistance (ISR) to protect the plants against biotic threats.

Advisor: R. Campos-Herrera.

Universitat Jaume I, Castello, Spain. 2th March to 5th March (4 days) 2021

Training: Culture methods of microorganisms, phytopathogens inoculations in plants, and the phenotyping after infection.

The Institute of Vine and Wine Sciences (ICVV), Logroño, Spain. 09/03/2020-12/12/2020

Research assistant: IN-vid (Agroecological innovation of the vineyard)

Objectives: as part of the CSIC ICOOP+ project, we evaluate the impact of earthworms, their mucus, entomopathogenic nematodes, or the two-by-two combination on the bacterial soil community associated with tomato plants. Plant traits, biocontrol activity, and bacterial richness and diversity by Next Generation Sequencing approach.

Advisor: R. Campos-Herrera.

The Institute of Vine and Wine Sciences (ICVV), Logroño, Spain. 06/07/2019–31/12/2019

Research assistant: IN-vid (Agroecological innovation of the vineyard)

Objectives: as part of the CSIC ICOOP+ project, we unravel the impact of earthworms and their mucus on the biocontrol potential of entomopathogenic nematodes.

Advisor : R. Campos-Herrera.

<https://www.icvv.es/el-grupo-vid-acoge-una-investigadora-de-marruecos-en-el-marco-del-programa-i-coop-del-csic>

Mohammed V University. Ecole Normale Supérieure, Rabat, Morocco. 01/09/2018-30/07/2019

Laboratory assistant : Centre « Eau, Ressources Naturelles, Environnement et Développement Durable (CERNE2D).

Objectives: Training undergraduate students, preparing and assisting with practical courses on Cellular biology, plant physiology, animal physiology, and microbiology.

University of Algarve, Faro, Portugal. 05/11/2017-03/05/2018

Research internship: MeditBio, Centre for Mediterranean Bioresources and Food, Faculty of Science and Technology.

Objectives: Biological interactions between earthworms and rhizosphere components: characterizing multi-trophic interactions to improve biocontrol of insect pests”.

The National Agricultural School, Meknès, Morocco. 01/04/2015-31/07/2015

Research training: For master’s degree.

Objectives: Evaluation of the fruit of cherry in the Middle Atlas (Morocco) for developing quality Distinctive Signs of Origin” Harvest samples of the study areas, Application of physical and chemical analyses.

The company studies and exploits algae and marine products (SETEXAM) kénitra, Morocco. 11/03/2013-14/12/2013

Bacteriological quality control technician:

Objectives: Prepare equipment, culture media, solutions, samples, and Physico-chemical and bacteriological analyses of finished and semi-finished products.

The Moroccan Association for International Cooperation and Sustainable Development in partnership with the European Association of International Cooperation, Azrou, Morocco.12/08/2017-26/08/2017

Volunteering:

Objectives: control and evaluation of sustainable development project in the rural town of Ain Leuh in the Middle Atlas.

AWARD AND GRANTS

2018

European Society of Nematologists (ESN) Ph.D. Student Bursary Award. 600€

2019

Society of invertebrate pathology, nematode division, Ph.D. students' awards 700€

2017-2018

The international mobility program "Mare-Nostrum" as a visiting student at the University of Algarve (Portugal).

2019-2021

The travel assistance grant is associated with CSICI-COOP+2018 (COOPA20231).

Biological interactions between earthworms and rhizosphere components: characterizing multi-trophic interactions to improve biocontrol of insect pests. Instituto de Ciencias de la Vid y del Vino (CSIC) (Logroño, La Rioja, España). Financed: 24'000.00 €.

https://digital.csic.es/browse?type=author&value=Chelkha%2C+Maryam&authority_lang=es_ES

ARTICLES

Yakkou, L., Houida, S., **Chelkha, M.**, Bilen, S., Raouane, M., Amghar, S., & El Harti, A. (2024). How do earthworms affect the microbial community during vermicomposting for organic waste recycling?. In *Earthworm Technology in Organic Waste Management* (pp. 15-39). Elsevier. <https://doi.org/10.1016/B978-0-443-16050-9.00032-3>

Houida, S., Yakkou, L., **Chelkha, M.**, Bilen, S., Bhat, S. A., Raouane, M., ... & Amghar, S. (2024). Exposure to emerging contaminants: ecotoxicological effects on earthworms and the potential of gut-associated microorganisms in bioremediation. In *Earthworm Technology in Organic Waste Management* (pp. 257-292). Elsevier. <https://doi.org/10.1016/B978-0-443-16050-9.00002-5>

Chelkha, M., Blanco-Pérez, R., Bueno-Pallero, F. Á., Amghar, S., el Harti, A., & Campos-Herrera, R. (2020). Cutaneous excreta of the earthworm *Eisenia fetida* (Haplotaxida: Lumbricidae) might hinder the biological control performance of entomopathogenic nematodes. *Soil Biology and Biochemistry*, 141. <https://doi.org/10.1016/j.soilbio.2019.107691>

Chelkha, M., Blanco-Pérez, R., Vicente-Díez, I., Bueno-Pallero, F. Á., Amghar, S., el Harti, A., & Campos-Herrera, R. (2021). Earthworms and their cutaneous excreta can modify the virulence and reproductive capability of entomopathogenic nematodes and fungi. *Journal of Invertebrate Pathology*, 184. <https://doi.org/10.1016/j.jip.2021.107620>

Chelkha, M., Yakkou, L., Houida, S., Raouane, M., Amghar, S., Campos-Herrera, R. El Harti, A. (2022). New insights on the impact of earthworm extract on the growth of beneficial soil fungi: species-specific alteration of the nematophagous fungal growth and limitation of an entomopathogenic fungus. *Turkish Journal of Zoology*, 46(6), 456-466. <https://doi:10.55730/1300-0179.3100>

Campos-Herrera, R., Vicente-Díez, I., Blanco-Pérez, R., **Chelkha, M.**, González-Trujillo, M. D. M., Puellas, M., Čepulitè, R., & Pou, A. (2021). Positioning entomopathogenic nematodes for the future viticulture: Exploring their use against biotic threats and as bioindicators of soil health. In Turkish Journal of Zoology (Vol. 45, Issue Special issue 1, pp. 335–346). Turkiye Klinikleri. <https://doi.org/10.3906/ZOO-2106-40>

Campos-Herrera, R., Vicente-Díez, I., Galeano, M., **Chelkha, M.**, del Mar González-Trujillo, M., Puellas, M., Labarga, D., Pou, A., Calvo, J., & Belda, J. E. (2021). Intraspecific virulence of entomopathogenic nematodes against the pests *Frankliniella occidentalis* (Thysanoptera: Thripidae) and *Tuta absoluta* (Lepidoptera: Gelechiidae). Journal of Nematology, 53. <https://doi.org/10.21307/JOFNEM-2021-102>

Vicente-Díez, I., Blanco-Pérez, R., **Chelkha, M.**, Puellas, M., Pou, A., & Campos-Herrera, R. (2021). Exploring the use of entomopathogenic nematodes and the natural products derived from their symbiotic bacteria to control the grapevine moth, *lobesia botrana* (Lepidoptera: Tortricidae). Insects, 12(11). <https://doi.org/10.3390/insects12111033>

Chelkha, M., Pérez, R. B., Pallero, F. B., Díez, I. V., Amghar, S., El Harti, A., & Herrera, R. C. (2020). Coexistencia de dos organismos beneficiosos del suelo: ¿ Pueden las lombrices de tierra alterar la actividad beneficiosa de los nematodos entomopatógenos como agentes de control biológico?. AE. Revista Agroecológica de Divulgación, (39), 4.

INTERNATIONAL MEETINGS

1) 7th International Congress of Nematology (ICN) which took place in Antibes Juan-Les-Pins from 1 to 6 May 2022.

Poster: Plasticity in the use *Xenorhabdus nematophila* and *Photorhabdus laumondii* against *Botrytis cinerea*. Ignacio Vicente-Díez, Rubén Blanco-Pérez, **Maryam Chelkha**, Alicia Pou, Raquel Campos-Herrera.

2) International Congress on Invertebrate Pathology and Microbial Control & 53rd Annual Meeting of the Society for Invertebrate Pathology (SIP LE STUDIUM). 28th June - 2nd July 2021.

Poster: *Steinernema carpocapsae* and *Xenorhabdus nematophila* based products for the control of the grapevine moth and the grey mold in vineyards. Ignacio Vicente-Díez, Rubén Blanco-Pérez, **Maryam Chelkha**, Miguel Puellas, Alicia Pou, Raquel Campos-Herrera.

3) International Congress on Invertebrate Pathology and Microbial Control & 53rd Annual Meeting of the Society for Invertebrate Pathology (SIP LE STUDIUM). 28th June - 2nd July 2021.

Poster: Screening of adjuvants to enhance the entomopathogenic nematode survival and adherence after aerial application on grapevine leaves. María del Mar González-Trujillo, Rasa Čepulyte, Ignacio Vicente-Díez, Rubén Blanco-Pérez, **Maryam Chelkha**, Miguel Puellas, Anna Gámez, José Luis Ramos-Sáez de Ojer, Raquel Campos-Herrera.

4) International Congress on Invertebrate Pathology and Microbial Control & 53rd Annual Meeting of the Society for Invertebrate Pathology (SIP LE STUDIUM). 28th June - 2nd July 2021.

Poster: Unravelling the effect of the presence of earthworms or their cutaneous excreta and entomopathogenic nematodes in the soil bacterial community (NGS), biocontrol capacity, and plant traits. **Maryam Chelkha**, María del Toro Hernández, Ignacio Vicente-Díez, Rubén Blanco-Pérez, Souad Amghar, Abdellatif El Harti, Alicia Pou, Raquel Campos-Herrera.

5) Virtual Conference of the Society of Nematologists, December 15th-16th 2020.

Poster: Unravelling earthworms' impact over entomopathogenic nematode infectivity: general trend or species-specific dependent? **Maryam Chelkha**, Rubén Blanco-Pérez, Ignacio Vicente-Díez, María del Mar González-Trujillo, Souad Amghar, Abdellatif El Harti, Raquel Campos-Herrera.

6) Virtual Conference of the Society of Nematologists, December 15th-16th 2020.

Poster: virulence of entomopathogenic nematodes against two aerial pests: *frankliniella occidentalis* (thysanoptera: thripidae) and *tuta absoluta* (lepidoptera: gelechiidae): intra- and interspecific variability. Ignacio Vicente-Díez, María del Mar González-Trujillo, Magda Galeano, **Maryam Chelkha**, José Eduardo Belda, Javier Calvo, Raquel Campos-Herrera.

7) Virtual Conference of the Society of Nematologists, December 15th-16th 2020.

Poster: Enhancing organic viticulture: insecticidal effect of entomopathogenic nematodes and the cell-free supernatant from *Xenorhabdus* and *Photorhabdus* bacteria against *Philaenus spumarius* (Hemiptera: Aphrophoridae), vector of *Xylella Fastidiosa* (Proteobacteria: Xanthomonadaceae). Ignacio Vicente-Díez, Rubén Blanco-Pérez, **Maryam Chelkha**, María del Mar González-Trujillo, Alicia Pou, and Raquel Campos-Herrera.

8) International Congress on Invertebrate Pathology and Microbial Control & 52nd Annual Meeting of the Society for Invertebrate Pathology & 17th Meeting of the IOBC-WPRS Working Group "Microbial and Nematode Control of Invertebrate Pests" 28th July - 1st August 2019. Valencia, from 28th July to 1st August of 2019.

Poster: The earthworm mucus and their feeding activity can decrease the biological control action by entomopathogenic nematodes and entomopathogenic fungi. **Maryam Chelkha**, Rubén Blanco-Pérez, Francisco ángel Bueno-Pallero, Abdellatif Abdellatif El Harti, Souad Amghar, Raquel Campos-Herrera.

9) 33 rd European Society of Nematologist meeting (ESN), Ghent, Belgium, September 9 th -13 th 2018.

Poster: The presence of earthworm mucus secretion could altered entomopathogenic nematodes activity as biological control agents. **Maryam Chelkha**, Rubén Blanco-Pérez, Francisco ángel Bueno-Pallero, Abdellatif El Harti, Souad Amghar, Raquel Campos-Herrera.

10) The Fourth International American Moroccan Agricultural Sciences Conference (AMAS) Conference IV, May 9th to 11th, 2018, Qualipôle-Agropolis, Meknes, Morocco.

Poster: Earthworm feeding activity and mucus secretion can decrease entomopathogenic nematodes activity as biological control agents. **Maryam Chelkha**, Rubén Blanco-Pérez, Francisco ángel Bueno-Pallero, Abdellatif El Harti, Souad Amghar, Raquel Campos-Herrera.

11) The 11th Spider Mite Genome Meeting 4 – 6 November, Logrono, Spain 2019.

Talk: Novel strategies for the management of *Tetranychus urticae* using beneficial soil organisms: direct and indirect measures concept. Raquel Campos-Herrera, Ignacio Vicente-Díaz, Joseane Moreira do Nascimento, **Maryam Chelkha**, Rubén Blanco-Pérez, Abdellatif El-Harti, Vojislava Grbic, Miodrag Grbic.

NATIONAL MEETINGS

1) 7th Edition of the International School of Research “Biodiversity, Biotechnology and Sustainable Development” Training Center of the Faculty of Medicine and Pharmacy of Agadir 25-27 April 2019.

Talk: The presence of earthworms as cadaver could alter the biological control by nematophagous fungi (*Arthrobotrys musiformis*, *purpureocillium lilacinum*) and entomopathogenic fungi (*Beauveria bassiana*). **Maryam Chelkha**, Lamia yakko, Sofia Houida, Mohamed Raouane, Souad Amghar, Raquel Campos-Herrera, Abdellatif El Harti.

2) The first edition of the doctoral days organized by the Water, Natural Resources, Environment and Sustainable Development Research Center of the Mohammed V University of Rabat under the theme: Water, Energy & Environment Nexus from June 12th to 14th, 2019 at the Ecole Normale Superior of Technical Education - Rabat, Morocco.

Talk: Earthworms feeding activity and mucus secretion alter biological control activity. **Maryam chelkha**, Rubén blanco-pérez, Francisco ángel Bueno-Pallero, Abdellatif El harti, Souad Amghar and Raquel Campos-Herrera.

3) The first edition of the doctoral days organized by the Water, Natural Resources, Environment and Sustainable Development Research Center of the Mohammed V University of Rabat under the theme: Water, Energy & Environment Nexus from June 12th to 14th, 2019 at the Ecole Normal Superior of Technical Education - Rabat, Morocco.

Poster: Earthworms' cocoons harbour beneficial bacteria for soil fertility. Sofia houida, Lamia yakkou, **Maryam chelkha**, Mohammed raouane, Abdellatif harti and souad amghar.

4) The first edition of the doctoral days organized by the Water, Natural Resources, Environment and Sustainable Development Research Center of the Mohammed V University of Rabat under the theme: Water, Energy & Environment Nexus from June 12th to 14th, 2019 at the Ecole Normale Superior of Technical Education - Rabat, Morocco.

Poster: Dissemination of solubilizing phosphorus bacteria by the earthworm *lumbricus terrestris* through the coelomic fluid. Lamia yakkou, Sofia houida, **Maryam chelkha**, Mohammed raouane, Abdellatif harti and Souad amghar.

5) Instituto de las Ciencias de la Vid y el Vino-CSIC, Logroño (Spain) on July 6, 2021.

Seminar: Biological interactions between earthworms and rhizosphere components: characterizing multi-trophic to improve biocontrol of insect pests Maryam CHELKHA.

ADDITIONAL SKILLS

Languages:

Arabic (Native)

French (fluent)

English (fluent)

Spanish (basic)

Molecular Biology and analytic methods

Plant and soil DNA, ARN, and cDNA

PCR and qPCR

Total Organic Carbon (TOC)

Insect and plant rearing:

Galleria mellonella, *Earthworm*, *Frankliniella occidentalis*, *Tuta absoluta*

Solanum lycopersicum L, *Vitis vinifera*, *Tall fescue*.

Microbiology:

Aseptic techniques

Bacterial culture techniques

Bacterial quantification and isolation,

Data Processing and visualization:

SPSS, QIIME2, R and Rstudio, WinRHIZO, Raven

REFERENCES

Pr. Raquel CAMPOS-HERRERA

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Pr. Kyle Wickings

Associate Professor, Department of Entomology Cornell AgriTech

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Pr. Souad AMGHAR

Mohammed V University, Department of Biology Ecole Normale Supérieure (ENS) in Rabat (Morocco).

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