



**MARIA DEL ROCIO
CALDERON MADRID**

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Summary of CV

This section describes briefly a summary of your career in science, academic and research; the main scientific and technological achievements and goals in your line of research in the medium -and long- term. It also includes other important aspects or peculiarities.

Dr. Calderón obtained her BE degrees in Agricultural and Civil Engineering at University of Córdoba, where she started her research career in the remote sensing (RS) discipline in 2008 with an undergraduate research grant from the Andalusian government. She completed her PhD in 2015 at the Sustainable Agriculture Institute (IAS-CSIC), under the supervision of Dr. Pablo Zarco Tejada and Dr. Juan Navas Cortés (funded by FPI grant). Her research aimed at developing and applying quantitative RS methods for the early detection of plant disease-induced stress via physiological-driven indicators retrieved from high-resolution hyperspectral and thermal imagery. Her PhD supposed a great step forward for RS and plant pathology disciplines due to the promising applicability in operational monitoring of plant diseases at large scales. These findings led to 5 papers published in Q1 journals (2 D1). In 2015, She was diagnosed with severe heart failure, which resulted in an invasive heart surgery in January 2016. This health condition prevented her from pursuing a postdoc career for 8 months.

Her PhD experience offered her the opportunity to collaborate in European initiatives (POnTE and XF-ACTORS) aimed at improving prevention, early detection and control of *Xylella fastidiosa* outbreaks in the EU via multidisciplinary research programs. As part of an international collaborative network leading RS for vegetation monitoring, an innovative methodology that combines radiative transfer modelling and machine learning was developed to reliably detect and differentiate pre-symptomatic disease by revealing distinct spectral fingerprints associated with the difference between biotic- vs. abiotic-stress conditions with similar visible symptomatology. She also investigated how to implement cost-effective RS monitoring solutions at regional scale. This research has been published in 4 D1 journals (Nature Plants, Nature Communications).

These collaborative networks helped her win the competitive Alfonso Martin Escudero Foundation postdoctoral fellowship in 2018 to develop her own research line at the University of Salford (United Kingdom) with Dr. Stephen Parnell (2 years). She studied the integration of RS data into epidemiological models to optimise early detection surveillance of *X. fastidiosa* outbreak in the EU. This work encouraged her to pursue a BSc in Mathematics concurrently with her postdoctoral career. This integrative work has been published in Remote Sensing of Environment and has developed research-based solutions to specific applications to the EU Plant Health policy.

Currently, she is a Postdoctoral Research Associate in Dr. Kaitlin Gold's lab at Cornell University (2021-2024), where she is expanding her expertise in plant disease sensing to the global scale. She is the lead postdoc on a NASA ROSES-funded project that integrates RS, aerosol transport, and comparative genomics to lay the foundation for a global disease surveillance system suitable for mapping risk of *Fusarium oxysporum* dispersal in aerosolized agricultural dust. In this role, she leads an interdisciplinary team of scientists of diverse career stages, from Cornell University, NASA Jet Propulsion Laboratory, and Penn State University. This work will improve food security safeguard by providing an accurate prediction of *Fusarium* wilt risk under various climate change scenarios. This research has led to one publication in Plant Disease and she anticipates more publications in a variety of journals, including Environmental Research Letters (in review), with more in preparation.



Her scientific production consists of 11 papers in JCR journals (h-index: 9; 1109 citations; 7 D1; 11 Q1; 5 as 1st author; 2 as 2nd author and corresponding author), 1 under review in D1 journals and 3 in preparation, as well as 3 dissemination articles. These papers are the result of a very intensive international collaboration with authors from 7 different countries. She has contributed to 14 congresses as 1st author (9 oral presentations; 13 international conferences; 2 invited speaker). She is reviewer for 10 JCR journals and Guest Editor of a Special Issue entitled Remote Sensing for Plant Diseases and Pests (Sustainability journal). She got involved in 11 competitive research projects (3 European, 5 National, 2 Regional, 1 from NASA) and was awarded 3 competitive research fellowships. She taught 5 workshops about RS applications in plant disease and guest lectured at graduate course at Cornell. She has mentored undergraduates, graduates and postdocs in Spain and the US.

**MARIA DEL ROCIO CALDERON MADRID**

Surname(s): **CALDERON MADRID**
 Name: **MARIA DEL ROCIO**
 ORCID: **0000-0002-7639-1795**
 Email: **mc2283@cornell.edu**

Current professional situation

Employing entity: Cornell University **Type of entity:** University
Department: Department of Plant Pathology and Plant-Microbe Biology
Professional category: Research Postdoctoral **Educational Management (Yes/No):** Yes
 Associate
City employing entity: Geneva, NY, United States of America
Start date: 07/02/2021
Type of contract: Temporary employment **Dedication regime:** Full time
 contract
Primary (UNESCO code): 120304 - Artificial intelligence; 220990 - Digital Treatment. Images; 250106 - Atmospheric dynamics; 310304 - Crop protection; 310805 - Fungi
Performed tasks: Developing a remote sensing framework for global plant disease surveillance and long-range soilborne pathogen dispersal in a changing climate by linking satellite remote-sensing products and atmospheric modelling tools with plant pathology ecology and comparative genomics. Experience with soilborne fungal biology, satellite remote sensing data, species distribution models, ArcGIS Pro and Online, earth system modelling, land carbon cycle modelling, data science, machine learning, Python and R. Principal Investigator: Dr. Kaitlin Gold.
Identify key words: Protection of plant life; Phytopathology; Fungal pathogens of plants; Invasión; Biodiversity status and trends; Climate change; Remote sensing

Previous positions and activities

	Employing entity	Professional category	Start date
1	University of Salford	Postdoctoral Fellow	16/02/2018
2	Instituto de Agricultura Sostenible	Research Associate	03/04/2017
3	Universidad de Córdoba	Research Associate	01/04/2016
4	Instituto de Agricultura Sostenible	Graduate Research Associate	03/11/2014
5	Instituto de Agricultura Sostenible	Graduate Research Fellow	01/11/2010
6	Universidad de Córdoba	Undergraduate Research Fellow	01/10/2008

1 **Employing entity:** University of Salford **Type of entity:** University
Department: School of Environment and Life Sciences, University of Salford
City employing entity: Manchester, Greater Manchester, United Kingdom
Professional category: Postdoctoral Fellow **Educational Management (Yes/No):** No
Start-End date: 16/02/2018 - 17/02/2020
Type of contract: Grant-assisted student (pre or post-doctoral, others)

Dedication regime: Full time

Primary (UNESCO code): 120808 - Stochastic processes; 220990 - Digital Treatment. Images; 240400 - Biomathematics; 241709 - Phytopathology; 310801 - Bacteria

Performed tasks: Integrating high-resolution hyperspectral and thermal remote sensing data into spatiotemporal epidemiological modelling to optimize early detection surveillance for *Xylella fastidiosa* outbreak in the European Union under the framework of the EU initiative XF-ACTORS. Experience in vector-borne plant pathogen biology and epidemiology, Plant Health EU policy, epidemiological modelling, spatial statistics, mathematical biology, Radiative Transfer Models (RTMs), Python and R. Principal Investigator: Dr. Stephen Parnell.

Identify key words: Models of determinist nets and stochastics; Phytopathology; Bacterial pathogens of plants; Invasión; Protection of plant life; Remote sensing

- 2** **Employing entity:** Instituto de Agricultura Sostenible **Type of entity:** State agency
Department: Agronomy, Instituto de Agricultura Sostenible
City employing entity: Córdoba, Andalusia, Spain
Professional category: Research Associate **Educational Management (Yes/No):** No
Start-End date: 03/04/2017 - 31/12/2017
Type of contract: Temporary employment contract
Dedication regime: Part time
Primary (UNESCO code): 220990 - Digital Treatment. Images; 310205 - Irrigation
Performed tasks: Integrating crop physiology and high-resolution hyperspectral and thermal remote sensing to monitor and diagnose almond and olive responses to water stress for sustainable irrigation management under the framework of the EU initiative SustainFARM. Experience in irrigation management, hyperspectral, thermal, chlorophyll fluorescence, machine learning, project management. Principal Investigator: Dr. Elias Fereres Castiel.
Identify key words: Water management; Farming system; Dry farming; Remote sensing
- 3** **Employing entity:** Universidad de Córdoba **Type of entity:** University
Department: Agronomy, Universidad de Córdoba
City employing entity: Córdoba, Andalusia, Spain
Professional category: Research Associate **Educational Management (Yes/No):** No
Start-End date: 01/04/2016 - 31/05/2016
Type of contract: Temporary employment contract
Dedication regime: Full time
Primary (UNESCO code): 310205 - Irrigation; 310391 - Use (management) combined water and fertilizer; 330515 - Hydraulic engineering
Performed tasks: Developing remote sensing methods based on high-resolution hyperspectral and thermal imagery to efficiently manage deficit-irrigation strategies in almond and olive. Experience in deficit irrigation management, remote sensing, hyperspectral, thermal, chlorophyll fluorescence, machine learning. Principal Investigator: Dr. Elias Fereres Castiel.
Identify key words: Water management
- 4** **Employing entity:** Instituto de Agricultura Sostenible **Type of entity:** State agency
Department: Agronomy, Instituto de Agricultura Sostenible
City employing entity: Córdoba, Andalusia, Spain
Professional category: Graduate Research Associate **Educational Management (Yes/No):** No
Start-End date: 03/11/2014 - 15/07/2015
Type of contract: Temporary employment contract
Dedication regime: Full time

Primary (UNESCO code): 120304 - Artificial intelligence; 220990 - Digital Treatment. Images; 310800 - Phytopathology; 310801 - Bacteria

Performed tasks: Developing machine-learning algorithms based on high-resolution hyperspectral and thermal data for the early detection of *Xylella fastidiosa* infection in olive. Experience in vector-borne plant diseases, hyperspectral, thermal, Radiative Transfer Models (RTMs), field campaigns, proximal sensing, machine learning and R. Principal Investigator: Dr. Pablo J. Zarco Tejada.

Identify key words: Protection of plant life; Phytopathology; Bacterial pathogens of plants; Invasión; Remote sensing

5 **Employing entity:** Instituto de Agricultura Sostenible **Type of entity:** State agency

Department: Agronomy and Plant Protection, Instituto de Agricultura Sostenible

City employing entity: Córdoba, Andalusia, Spain

Professional category: Graduate Research Fellow **Educational Management (Yes/No):** No

Start-End date: 01/11/2010 - 01/11/2014

Type of contract: Grant-assisted student (pre or post-doctoral, others)

Dedication regime: Full time

Primary (UNESCO code): 220990 - Digital Treatment. Images; 310304 - Crop protection; 310800 - Phytopathology; 310805 - Fungi

Performed tasks: Developing quantitative remote sensing methods for the early detection of the stress caused by plant diseases. Experience in soilborne and wind-spread plant diseases, remote sensing, hyperspectral, thermal, chlorophyll fluorescence, Radiative Transfer Models (RTMs), field campaigns, proximal sensing, machine learning and R. Principal Investigators: Dr. Pablo J. Zarco Tejada and Dr. Juan A. Navas Cortés.

Identify key words: Phytopathology; Fungal pathogens of plants; Protection of plant life; Remote sensing

6 **Employing entity:** Universidad de Córdoba **Type of entity:** University

Department: Graphic Engineering and Geomatics, Universidad de Córdoba

City employing entity: Córdoba, Andalusia, Spain

Professional category: Undergraduate Research Fellow **Educational Management (Yes/No):** No

Start-End date: 01/10/2008 - 31/08/2009

Type of contract: Grant-assisted student (pre or post-doctoral, others)

Dedication regime: Part time

Primary (UNESCO code): 220990 - Digital Treatment. Images; 590201 - Agricultura) policy

Performed tasks: Developing three-dimensional models with airborne LIDAR to help herbaceous crops discrimination in agricultural subsidies control. Experience in LIDAR processing data, ArcGIS, ENVI, statistical analysis, and EU Common Agricultural Policy. Principal Investigators: Dr. José E. Meroño De Larriva and Dr. Isabel L. Castillejo González.

Identify key words: Agricultural policy; Remote sensing



Education

University education

1st and 2nd cycle studies and pre-Bologna degrees

- 1** **University degree:** Higher degree
Name of qualification: B.S., Mathematics
City degree awarding entity: Málaga, Andalusia, Spain
Degree awarding entity: Universidad Nacional de Educación a Distancia (UNED) **Type of entity:** University
Date of qualification: 30/09/2025
- 2** **University degree:** Middle degree
Name of qualification: B.E., Civil Engineering
City degree awarding entity: Belmez, Andalusia, Spain
Degree awarding entity: Universidad de Córdoba **Type of entity:** University
Date of qualification: 28/07/2010
- 3** **University degree:** Higher degree
Name of qualification: M.S., Projects and Management of Agri-food Industries
City degree awarding entity: Córdoba, Andalusia, Spain
Degree awarding entity: Universidad de Córdoba **Type of entity:** University
Date of qualification: 14/06/2010
- 4** **University degree:** Higher degree
Name of qualification: B.E., Agricultural Engineering
City degree awarding entity: Córdoba, Andalusia, Spain
Degree awarding entity: Universidad de Córdoba **Type of entity:** University
Date of qualification: 12/11/2009

Doctorates

Doctorate programme: Biosciences
Degree awarding entity: Universidad de Córdoba **Type of entity:** University
City degree awarding entity: Córdoba, Andalusia, Spain
Date of degree: 22/07/2015
Thesis title: Detection of Verticillium wilt in olive using high-resolution hyperspectral and thermal remote sensing imagery
Thesis director: Pablo J. Zarco Tejada
Thesis co-director: Juan A. Navas Cortés
Obtained qualification: 10 Cum Laude
Recognition of quality: Yes



Language skills

Language	Listening skills	Reading skills	Spoken interaction	Speaking skills	Writing skills
English	C1	C1	C1	C1	C1
Spanish	C2	C2	C2	C2	C2

Teaching experience

General teaching experience

Name of the course: Engineering Novel Strategies for Plant Science Measurement and Sensing

University degree: Plant Sciences Graduate School

Start date: 01/10/2022

End date: 05/12/2022

Entity: Cornell University

Type of entity: University

City of entity: Ithaca, NY, United States of America

Experience supervising doctoral thesis and/or final year projects

- Project title:** Idoneidad medioambiental global de la incidencia por *Fusarium oxysporum* f. sp. cubense raza TR4 en banano a través de imágenes satelitales

Type of project: Work leading to an ASD

Co-director of thesis: Juan Moral Moral

Entity: Universidad de Córdoba

City of entity: Córdoba, Andalusia, Spain

Student: Valle Egea Cobrero

Date of reading: 26/07/2023

Type of entity: University
- Project title:** Assessing the long-distance atmospheric transport of soil-borne fungal spores

Type of project: End of course project

Co-director of thesis: Natalie Mahowald

Entity: Cornell University

City of entity: Ithaca, United States of America

Student: Hannah K. Brodsky

Date of reading: 20/05/2022

Type of entity: University

Teaching experience in courses and seminars for university teacher training

- Type of event:** Workshop

Name of the event: Xylella fastidiosa Workshop: from diagnosis to management

City organizing entity: Sao Paulo, Brazil

Organising entity: Universidade de Sao Paulo

Hours of teaching: 1

Teaching date: 18/08/2022



- 2** **Type of event:** Workshop
Name of the event: 1er Foro Nacional de Investigación Agropecuaria del Trópico y Oportunidades para el Sector Agropecuario en el Trópico
Organising entity: Instituto Tecnológico Superior de Tanyouca
Hours of teaching: 2
Teaching date: 23/02/2022
- 3** **Type of event:** Workshop
Name of the event: Olivicultura de Precisión: el futuro del cultivo del olivo
City organizing entity: Baeza, Andalusia, Spain
Organising entity: Universidad Internacional de Andalucía
Type of entity: University
Hours of teaching: 3
Teaching date: 19/05/2018
- 4** **Type of event:** Workshop
Name of the event: Jornada científico técnica de teledetección aplicada a la agricultura
City organizing entity: Lleida, Catalonia, Spain
Organising entity: Instituto de Investigación y Tecnología Agroalimentarias (IRTA)
Hours of teaching: 1
Teaching date: 29/06/2017
- 5** **Type of event:** Workshop
Name of the event: Utilidad de la Teledetección - Drones para el manejo de la sanidad vegetal
City organizing entity: Zaragoza, Aragon, Spain
Organising entity: Centro de Investigación y Tecnología Agroalimentaria de Aragón (CITA)
Hours of teaching: 2
Teaching date: 07/10/2015

Scientific and technological experience

Scientific or technological activities

R&D projects funded through competitive calls of public or private entities

- 1** **Name of the project:** Soilborne plant pathogen dispersal and assessment: Building a remote sensing-based global surveillance system for plant disease
Entity where project took place: Cornell University **Type of entity:** University
City of entity: Geneva, United States of America
Name principal investigator (PI, Co-PI....): Kaitlin M. Gold; Natalie Maholwald; Sharifa Crandall; Ryan Pavlick
Nº of researchers: 4
Funding entity or bodies:
National Aeronautics and Space Administration (NASA)
Name of the programme: NASA ROSES-19 A.32 NNH19ZDA001N-IDS
Code according to the funding entity: 80NSSC20K1533
Start-End date: 01/09/2020 - 31/08/2023



Participating entity/entities: Cornell University; NASA Jet Propulsion Laboratory (JPL); Penn State University

Total amount: 666.290 €

Applicant's contribution: Lead postdoc and project coordinator of three partners.

- 2 Name of the project:** XF-ACTORS: Xylella Fastidiosa Active Containment Through a multidisciplinary-Oriented Research Strategy

Entity where project took place: Consiglio Nazionale delle Ricerche (CNR)

Type of entity: State agency

City of entity: Bari, Puglia, Italy

Name principal investigator (PI, Co-PI....): Maria Saponari

Nº of researchers: 31

Funding entity or bodies:

European Commission

Name of the programme: Horizon 2020 (EU Research & Innovation programme)

Code according to the funding entity: 727987

Start-End date: 01/11/2016 - 30/04/2021

Total amount: 6.964.125 €

Applicant's contribution: Postdoc on the WP3 "Early detection of X. fastidiosa symptoms using remote sensing", and WP4 "Implementation of sampling schemes and innovative tools for early detection of X. fastidiosa in host plants" at IAS-CSIC and University of Salford

- 3 Name of the project:** Integrating spread modeling and remote sensing imagery to optimise early detection surveillance for Xylella fastidiosa in the European Union

Entity where project took place: University of Salford

Type of entity: University

City of entity: Manchester, Greater Manchester, United Kingdom

Name principal investigator (PI, Co-PI....): Rocio Calderón Madrid; Stephen Parnell

Nº of researchers: 2

Funding entity or bodies:

Fundación Alfonso Martín Escudero

Start-End date: 16/02/2018 - 17/02/2020

Total amount: 67.800 €

Applicant's contribution: Project conceptualization, investigation, administration, and funding acquisition.

- 4 Name of the project:** POnTE: Pest Organisms Threatening Europe

Entity where project took place: Consiglio Nazionale delle Ricerche (CNR)

Nº of researchers: 25

Funding entity or bodies:

European Commission

Name of the programme: Horizon 2020 (EU Research & Innovation programme)

Code according to the funding entity: 635646

Start-End date: 01/11/2015 - 31/10/2019

Total amount: 6.919.796,5 €

Applicant's contribution: Postdoc on the WP6 "Field and automated surveillance system for vector and disease monitoring" at IAS-CSIC and University of Salford

- 5 Name of the project:** SustainFARM: Innovative and sustainable intensification of integrated food and non-food systems to develop climate-resilient agro-ecosystems in Europe

Entity where project took place: University of Copenhagen (UCPH)

Type of entity: University



City of entity: Taastrup, Danmark, Denmark

Name principal investigator (PI, Co-PI....): Bhim Bahadur Ghaley; Robert Borek; Elias Fereres Castiel; Andrea Pisanelli; Mignon Sandor; Markus Hassler; Jo Smith

Nº of researchers: 7

Funding entity or bodies:

FACCE SURPLUS ERA-NET

Start-End date: 01/03/2016 - 28/02/2019

Total amount: 1.751.000 €

Applicant's contribution: Project coordinator of the Spanish partner conducting research on remote sensing for water use efficiency in Spanish agroecosystems, and the preparation of reports and deliverables.

- 6 Name of the project:** Development of a support system for making decisions to mitigate the impact of soil pathogens in olive and promote beneficial microbiota in present climate and climate change

Entity where project took place: Instituto de Agricultura Sostenible

Type of entity: State agency

City of entity: Córdoba, Andalusia, Spain

Name principal investigator (PI, Co-PI....): Juan A. Navas Cortés

Nº of researchers: 1

Funding entity or bodies:

Ministerio de Economía y Competitividad

Name of the programme: Plan Nacional de I+D

Code according to the funding entity: AGL2012-37521

Start-End date: 01/01/2013 - 31/12/2015

Total amount: 251.550 €

Applicant's contribution: PhD research on the effect of soil temperature on Verticillium wilt incidence and severity

- 7 Name of the project:** Strategies of deficit irrigation in almond

Entity where project took place: Universidad de Córdoba

Type of entity: University

City of entity: Córdoba, Andalusia, Spain

Name principal investigator (PI, Co-PI....): Elias Fereres Castiel

Nº of researchers: 1

Funding entity or bodies:

Ministerio de Economía y Competitividad

Name of the programme: Plan Nacional de I+D

Code according to the funding entity: AGL2012-35196

Start-End date: 01/01/2013 - 31/12/2015

Total amount: 140.400 €

Applicant's contribution: Mentor Elias Fereres' PhD student (Manuel López López) to investigate the early detection of almond red leaf blotch with high-resolution hyperspectral and thermal imagery

- 8 Name of the project:** Estimation methods of chlorophyll fluorescence in olive, orange and grapevine using hyperspectral microsenors on board UAVs

Entity where project took place: Instituto de Agricultura Sostenible

Type of entity: State agency

City of entity: Córdoba, Andalusia, Spain

Name principal investigator (PI, Co-PI....): Pablo J. Zarco Tejada

Nº of researchers: 1

Funding entity or bodies:



Ministerio de Economía y Competitividad

Name of the programme: Plan Nacional de I+D

Code according to the funding entity: AGL2012-40053

Start-End date: 01/01/2013 - 01/01/2015

Total amount: 170.000 €

Applicant's contribution: PhD research on the use of chlorophyll fluorescence retrieved from hyperspectral sensors to early detect Verticillium wilt of olive and downy mildew of opium poppy

- 9** **Name of the project:** Hyperspectral and thermal remote sensing for the detection of stress and monitoring of physiological parameters in grapevine and olive

Entity where project took place: Instituto de Agricultura Sostenible

Type of entity: State agency

City of entity: Córdoba, Andalusia, Spain

Name principal investigator (PI, Co-PI....): Pablo J. Zarco Tejada

Nº of researchers: 1

Funding entity or bodies:

Ministerio de Ciencia e Innovación

Type of entity: Body, others

Name of the programme: Plan Nacional de I+D

Code according to the funding entity: AGL2009-13105

Start-End date: 01/01/2010 - 31/12/2012

Total amount: 217.800 €

Applicant's contribution: Associated project to Rocio Calderón's FPI grant

- 10** **Name of the project:** Impact of climate change on plant diseases. Verticillium wilt and its interactions with soil microbiota and plant-pathogenic nematodes, and early identification by remote sensing

Entity where project took place: Instituto de Agricultura Sostenible

Type of entity: State agency

City of entity: Córdoba, Andalusia, Spain

Name principal investigator (PI, Co-PI....): Juan A. Navas Cortés

Nº of researchers: 1

Funding entity or bodies:

Consejería de Economía, Innovación y Ciencia, Junta de Andalucía and FEDER financial support from the European Union

Code according to the funding entity: P08-AGR-03528

Start-End date: 01/01/2009 - 13/01/2012

Total amount: 192.000 €

Applicant's contribution: PhD research on the early identification of Verticillium wilt with remote sensing.

- 11** **Name of the project:** Epidemiology and control of downy mildew of opium poppy in Spain

Entity where project took place: Instituto de Agricultura Sostenible

Type of entity: State agency

City of entity: Córdoba, Andalusia, Spain

Name principal investigator (PI, Co-PI....): Blanca B. Landa

Nº of researchers: 1

Funding entity or bodies:

Ministerio de Educación y Ciencia of Spain and the European Social Fund

Code according to the funding entity: PET2006_0444

Start-End date: 01/01/2008 - 01/01/2009

Total amount: 108.870 €



Applicant's contribution: PhD research on the early detection of downy mildew of opium poppy with remote sensing.

Scientific and technological activities

Scientific production

Publications, scientific and technical documents

- 1** T. Poblete; J.A. Navas-Cortés; A. Hornero; C. Camino; R. Calderón; R. Hernández-Clemente; B.B. Landa; P.J. Zarco-Tejada. Detection of symptoms induced by vascular plant pathogens in tree crops using high-resolution satellite data: Modelling and assessment with airborne hyperspectral imagery. Remote Sensing of Environment. 295, pp. 113698 - 113698. 09/2023.
Type of production: Scientific paper **Format:** Journal
- 2** R. Calderón; J.A. Eller; H.K. Brodsky; A.D. Miles; S.G. Crandall; N. Mahowald; R. Pavlick; K.M. Gold. An Interactive, Online Web Map Resource of Global Fusarium oxysporum ff. spp. Diversity and Distribution. Plant Disease. 107 - 2, pp. 538 - 541. 12/2022.
Type of production: Scientific paper **Format:** Journal
Corresponding author: Yes
- 3** P.J. Zarco-Tejada; T. Poblete; C. Camino; V. González-Dugo; R. Calderón; A. Hornero; R. Hernández-Clemente; M. Roman-Ecija; M.P. Velasco-Amo; B.B. Landa; P.S.A. Beck; M. Saponari; D. Boscia; J.A. Navas-Cortés. Divergent abiotic spectral pathways unravel pathogen stress signals across species. Nature Communications. 12 - 1, pp. 6088 - 6088. 10/2021.
Type of production: Scientific paper **Format:** Journal
- 4** T. Poblete; J.A. Navas-Cortés; C. Camino; R. Calderón; A. Hornero; V. González-Dugo; B.B. Landa; P.J. Zarco-Tejada. Discriminating Xylella fastidiosa from Verticillium dahliae infections in olive trees using thermal- and hyperspectral-based plant traits. ISPRS Journal of Photogrammetry and Remote Sensing. 179, pp. 133 - 144. 09/2021.
Type of production: Scientific paper **Format:** Journal
- 5** C. Camino; R. Calderon; S. Parnell; H. Dierkes; Y. Chemin; M. Roman-Ecija; M. Montes-Borrego; B. B. Landa; J. A. Navas-Cortes; P. J. Zarco-Tejada; P. S. A. Beck. Detection of Xylella fastidiosa in almond orchards by synergic use of an epidemic spread model and remotely sensed plant traits. Remote Sensing of Environment. 260, pp. 112420 - 112420. 07/2021.
Type of production: Scientific paper **Format:** Journal
- 6** P.J. Zarco-Tejada; C. Camino; P.S.A. Beck; R. Calderon; A. Hornero; R. Hernandez-Clemente; T. Kattenborn; M. Montes-Borrego; L. Susca; M. Morelli; V. Gonzalez-Dugo; P.R.J. North; B.B. Landa; D. Boscia; M. Saponari; J.A. Navas-Cortes. Previsual symptoms of Xylella fastidiosa infection revealed in spectral plant-trait alterations. Nature Plants. 4 - 7, pp. 432 - 439. 07/2018.
Type of production: Scientific paper **Format:** Journal
- 7** M. López-López; R. Calderón; V. González-Dugo; P.J. Zarco-Tejada; E. Fereres. Early Detection and Quantification of Almond Red Leaf Blotch Using High-Resolution Hyperspectral and Thermal Imagery. Remote Sensing. 8 - 4, pp. 276 - 276. 04/2016.
Type of production: Scientific paper **Format:** Journal
Corresponding author: Yes

- 8** R. Calderón; J.A. Navas-Cortés; P.J. Zarco-Tejada. Early Detection and Quantification of Verticillium Wilt in Olive Using Hyperspectral and Thermal Imagery over Large Areas. Remote Sensing. 7 - 5, pp. 5584 - 5610. 05/2015.
Type of production: Scientific paper **Format:** Journal
- 9** R. Calderón; M. Montes-Borrego; B. B. Landa; J. A. Navas-Cortés; P. J. Zarco-Tejada. Detection of downy mildew of opium poppy using high-resolution multi-spectral and thermal imagery acquired with an unmanned aerial vehicle. Precision Agriculture. 15 - 6, pp. 639 - 661. 12/2014.
Type of production: Scientific paper **Format:** Journal
- 10** R. Calderon; C. Lucena; J.L. Trapero-Casas; P.J. Zarco-Tejada; J.A. Navas-Cortes. Soil Temperature Determines the Reaction of Olive Cultivars to Verticillium dahliae Pathotypes. PLOS ONE. 9 - 10, pp. e110664 - e110664. 10/2014.
Type of production: Scientific paper **Format:** Journal
- 11** R. Calderón; J.A. Navas-Cortés; C. Lucena; P.J. Zarco-Tejada. High-resolution airborne hyperspectral and thermal imagery for early, detection of Verticillium wilt of olive using fluorescence, temperature and narrow-band spectral indices. Remote Sensing of Environment. 139, pp. 231 - 245. 12/2013.
Type of production: Scientific paper **Format:** Journal
- 12** J. Blasco; R. Calderón; N. Aleixos; C. Camino; P.S.A. Beck; B. Rey; A. Hornero; S. López; R. Hernández-Clemente; V. Alegre; T. Kattenborn; M. Montes-Borrego; L. Susca; M. Morelli; C Ruiz; V. González-Dugo; P.R.J. North; E. Aguilar; B.B. Landa; D. Boscia; M. Saponari; P. Chueca; P.J. Zarco-Tejada; S. Cubero; J.A. Navas-Cortés. Avances en teledetección para la prevención y detección temprana de Xylella fastidiosa en el marco de los proyectos H2020 POnTE y XF-ACTORS. Agricultura: Revista agropecuaria y ganadera. 1023, pp. 44 - 48. 2018.
Type of production: Popular science article **Format:** Journal
Corresponding author: No
- 13** Rocío Calderón; Pablo J. Zarco-Tejada; Juan A. Navas-Cortés; Blanca B. Landa; Manuel López-López. Detección de enfermedades de cultivo mediante imágenes hiperespectrales y térmicas de alta resolución espacial. Grandes Cultivos. 18, pp. 40 - 46. 2018.
Type of production: Popular science article
Corresponding author: Yes
- 14** R. Calderón; C. Camino; P.S.A. Beck; A. Hornero; R. Hernández-Clemente; T. Kattenborn; M. Montes-Borrego; L. Susca; M. Morelli; V. González-Dugo; P.R.J. North; B.B. Landa; D. Boscia; M. Saponari; P.J. Zarco-Tejada; J.A. Navas-Cortés. Detección pre-visual de la infección por Xylella fastidiosa en olivo a partir de imágenes hiperespectrales y térmicas. Phytoma. 304, pp. 48. 2018.
Type of production: Popular science article **Format:** Journal
Corresponding author: Yes

Works submitted to national or international conferences

- 1** **Title of the work:** Assessing long-distance, transoceanic and intercontinental atmospheric transport of soilborne plant pathogens entrained with aerosolized agricultural dust
Name of the conference: 12th International Congress of Plant Pathology (ICPP)
Corresponding author: Yes
City of event: Lyon, France
Date of event: 20/08/2023
End date: 25/08/2023
H. Brodsky; R. Calderón; D.S. Hamilton; L. Li; A. Miles; R. Pavlick; K. Gold; S. Crandall; N. Mahowald.



- 2** **Title of the work:** Mapping global risk of Fusarium wilt in a changing climate with remote sensing and aerosol transport modeling
Name of the conference: ICPP Satellite event “How to combine remote sensing with epidemiological modelling to improve plant disease management?”
Corresponding author: Yes
City of event: Lyon, France
Date of event: 19/08/2023
End date: 20/08/2023
R. Calderón; H. Brodsky; C. Vosburg; J. Eller; A. Miles; N. Mahowald; S. Crandall; R. Pavlick; K. Gold.
- 3** **Title of the work:** A global surveillance system for Fusarium wilt in a changing climate by integrating remote sensing and aerosol transport modeling
Name of the conference: NASA Carbon Cycle and Ecosystems Joint Science Workshop
Corresponding author: Yes
City of event: College Park, MD, United States of America
Date of event: 08/05/2023
End date: 12/05/2023
R. Calderón; H. Brodsky; C. Vosburg; J. Eller; A. Miles; N. Mahowald; S. Crandall; R. Pavlick; K. Gold.
- 4** **Title of the work:** Toward a global surveillance system for Fusarium wilt in a changing climate by integrating remote sensing and aerosol transport modeling
Name of the conference: American Geophysical Union Fall Meeting
Corresponding author: Yes
City of event: Chicago, IL, United States of America
Date of event: 12/12/2022
End date: 16/12/2022
R. Calderón; H. Brodsky; C. Vosburg; J. Eller; A. Miles; N. Mahowald; S. Crandall; R. Pavlick; K. Gold.
- 5** **Title of the work:** Mapping global risk of Fusarium wilt in a changing climate with remote sensing and aerosol transport modeling
Name of the conference: Plant Health 2022 - American Phytopathological Society
Corresponding author: Yes
City of event: Pittsburgh, PA, United States of America
Date of event: 06/08/2022
End date: 10/08/2022
R. Calderón; H. Brodsky; A. Miles; J. Eller; N. Mahowald; S. Crandall; R. Pavlick; K. Gold.
- 6** **Title of the work:** Soilborne plant pathogen dispersal and assessment: Building a remote sensing-based global surveillance system for plant disease
Name of the conference: International Conference on Digital Technologies for Sustainable Crop Production (DIGICROP)
Corresponding author: Yes
City of event: Remote Event, Germany
Date of event: 28/03/2022
End date: 30/03/2022
R. Calderón; B. Hannah; A. Miles; J. Eller; N. Mahowald; S. Crandall; R. Pavlick; K. Gold.
- 7** **Title of the work:** Soilborne plant pathogen dispersal and assessment: Building a remote sensing-based global surveillance system for plant disease
Name of the conference: American Geophysical Union Fall Meeting
Corresponding author: Yes



City of event: New Orleans, LA, United States of America

Date of event: 13/12/2021

End date: 17/12/2021

R. Calderón; B. Hannah; A. Milles; J. Eller; N. Mahowald; S. Crandall; R. Pavlick; K. Gold.

- 8 Title of the work:** Integrating spread modeling and remote sensing imagery to optimise early detection and spatial distribution estimation of *Xylella fastidiosa*

Name of the conference: 2nd European Conference on *Xylella fastidiosa*

Corresponding author: Yes

City of event: Ajaccio, France

Date of event: 29/10/2019

End date: 30/10/2019

R. Calderón; S. Parnell.

- 9 Title of the work:** Detección temprana de enfermedades mediante imágenes hiperespectrales y térmicas de alta resolución espacial

Name of the conference: XX Congreso Internacional en Ciencias Agrícolas

City of event: Mexicali, Mexico

Date of event: 26/10/2017

End date: 27/10/2017

R. Calderón.

- 10 Title of the work:** Early detection and quantification of *Verticillium* wilt in olive using hyperspectral and thermal imagery acquired by manned platforms at regional scale

Name of the conference: 4th International Symposium in Recent Advances in Quantitative Remote Sensing

Corresponding author: Yes

City of event: Valencia, Valencian Community, Spain

Date of event: 22/09/2014

End date: 26/09/2014

R. Calderón; J.A. Navas-Cortés; P.J. Zarco-Tejada.

- 11 Title of the work:** Early detection and quantification of *Verticillium* wilt in olive using UAV and manned platforms to acquire hyperspectral and thermal imagery at local and regional scale

Name of the conference: 2nd International Conference on Robotics, Associated High-Technologies and Equipment for Agriculture and Forestry

Corresponding author: Yes

Date of event: 21/05/2014

End date: 23/05/2014

R. Calderón; J.A. Navas-Cortés; P.J. Zarco-Tejada.

- 12 Title of the work:** Detection of *Verticillium* wilt of olive trees and downy mildew of opium poppy using hyperspectral and thermal UAV imagery

Name of the conference: European Geosciences Union General Assembly 2014

Corresponding author: Yes

City of event: Vienna, Austria

Date of event: 27/04/2014

End date: 02/05/2014

R. Calderón; J.A. Navas-Cortés; M. Montes-Borrego; B.B. Landa; C. Lucena; P.J. Zarco-Tejada.



- 13** **Title of the work:** Teledetección aerotransportada hiperespectral y térmica de alta resolución para la detección temprana de Verticilosis en olivar usando fluorescencia, temperatura e índices espectrales
Name of the conference: XV Congreso de la Asociación Española de Teledetección
Corresponding author: Yes
City of event: Torrejón de Ardoz, Community of Madrid, Spain
Date of event: 22/10/2013
End date: 24/10/2013
R. Calderón; J.A. Navas-Cortés; C. Lucena; P. J. Zarco-Tejada.
- 14** **Title of the work:** High-resolution hyperspectral and thermal imagery acquired from UAV platforms for early detection of Verticillium wilt using fluorescence, temperature and narrow-band indices
Name of the conference: Workshop on UAV-based Remote Sensing Methods for Monitoring Vegetation
Corresponding author: Yes
City of event: Cologne, Germany
Date of event: 09/09/2013
End date: 10/09/2013
R. Calderón; J.A. Navas-Cortés; C. Lucena; P.J. Zarco-Tejada.

Other achievements

Obtained grants and scholarships

- 1** **Name of the grant:** Postdoctoral Research Fellowship
Aims: Post-doctoral
Awarding entity: Alfonso Martín Escudero Foundation
Conferral date: 16/02/2018
End date: 17/02/2020
Entity where activity was carried out: University of Salford
- 2** **Name of the grant:** Graduate Research Fellowship (FPI)
Aims: Pre-doctoral
Awarding entity: Spanish Ministry of Science
Conferral date: 01/11/2010
End date: 01/11/2014
Entity where activity was carried out: Instituto de Agricultura Sostenible
- 3** **Name of the grant:** Undergraduate Research Fellowship
Aims: MSc Thesis
Awarding entity: Department of Agriculture and Fish, Andalusian Government
Conferral date: 01/10/2008
End date: 31/08/2009
Entity where activity was carried out: Universidad de Córdoba

**C****V****N**

CURRÍCULUM VITAE NORMALIZADO

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Prizes, mentions and distinctions

Description: XVI Prize for the best Doctoral Thesis

Awarding entity: Andalusian Association of Agricultural Engineers

City awarding entity: Córdoba, Andalusia, Spain

Conferral date: 15/05/2016