

A.1. Current position

Position	Proffessor
Initial date	October 2020 – Maternity leave interruption: 16 weeks.
Institution	University of Salamanca
Departament/Center	Microbiology and Genetics/Faculty of Pharmacy
Country	Spain
Key words	Bacterial biofertilizers, plant growth promotion, N fixation, plants-bacterial interaction, plants-insects-bacterial interactions, massive parallel sequencing, genome sequencing, (meta)genomics

A.2. Previous positions (research activity interruptions, art. 45.2.c))

Period	Position/Institution/Country/Interruption cause
2019-2020	Postdoctoral researcher Junta de Castilla y León. Univ. of Salamanca. Spain
2017-2019	Postdoctoral researcher Marie Curie. Univ. of Salamanca. Spain
2016-2017	Researcher. MealFood Europe. Spain
2015-2016	Researcher. Czech Academy of Science. Czech Republic
2012-2015	Postdoctoral researcher. Czech Academy of Science. Czech Republic. Maternity leave interruption, 24 weeks.
2010-2012	Postdoctoral researcher. John Innes Center. United Kingdom
2010-2010	Coordinator of R&D projects. National Center for Food Security and Tech. Spain
2008-2010	Postdoctoral researcher. Univ. of Salamanca. Spain
2004-2008	PhD student. Univ. of Salamanca. Spain

A.3. Education

Year	University	Degree	Title
2003	U. of Salamanca	Bachelor	Environmental Sciences
2004	U. of Salamanca	Master thesis	Master thesis in Environmental Sciences
2005	U. of Salamanca	DEA	Diploma of Advance Studies
2008	U. of Salamanca	PhD	Microbiology and Genetics
2009	U. of Salamanca	Bachelor	Agricultural Engineering Technology

Part B. CV SUMMARY (max. 5000 characters, including spaces)

My scientific production has been published in 107 publications: 71 JCR articles, 15 book chapters, 18 proceedings, 2 articles in non-indexed scientific journals, 11 dissemination articles. All this production gives me an H-index: 24 (WOS), 30 (Google). i10-index: 55. Citations: 1634 (WOS), 2850 (Google). I am also author of more than 70 contributions to national and international conferences, with 5 keynote speeches and 30 oral presentations. I am also author of a patent. I have made scientific contributions in several research lines:

1. Taxonomy, phylogeny, and diversity of microorganisms associated to plants, soils and other niches: I have along my whole scientific career contributed to the description of 17 new species and 4 new genera, and contributed to several taxonomic, phylogenetic, phylogenomic and microbial diversity studies, including a reclassification of the genus *Pseudomonas* based on phylogenomic analysis, published in *Biology*, of which I am last author.

2. Rhizobia-legumes interactions: As a result of my postdoctoral research at the John Innes Centre, I discovered several genes implicated in the capability of rizobia to compete in the rhizosphere of peas, published in *Plant and Soil* (first author).

3. Application of bacteria as plant inoculants: during my research work (pre- and postdoctoral) I have participated in several studies on the analyses of the effects of diverse PGP bacteria in the promotion of several crops, highlighting a publication related to the potential of rizobia to increase crops quality published in *PLOS One*, of which I am first author.

4. PGP bacteria-non-legume plants interactions: during my Marie Curie Fellowship I studied bacterial endophytes with capability to promote canola crops, with some discoveries published in journals as *Agronomy* or *Microorganisms*, of which I am last author. Also, I got funds from the Ministry

of Science and Innovation(co-PI) to study microbial communities associated with blueberries and blackberries, with the aim to select bacterial fertilizers increasing yields and quality (on going). I have organized 13 specialization courses and 18 scientific seminars.

5. Insect-Plant-Microbe interactions: during my period at the Czech Academy of Sciences and the Torres Quevedo grant, I studied, respectively, microbial diversity in bark beetles and microbes in the faeces of *T. molitor* and their potential to promote plant growth. I have several publications as last author in Q1 journals related to these research line, including *STOTEN* or *Applied Soil Ecology*.

I have participated in 21 competitive R&D&I projects, being PI in 8, having raised national and international funds for nearly € 1 M. I have also participated in 16 contracts with companies, having raised as PI more than € 60,000. I have been project manager at the CNTA and administrator of a collection of bacterial germplasm. I have supervised 3 Postdoctoral Researchers, 7 Doctoral Theses (3 ongoing), 1 Thesis, 2 TFMs and 9TFGs. Doctors of the 4 ended thesis I have supervised are all of them in Academia, as associate professors, or postdoctoral researchers.

The knowledge I have acquired during my research career includes plant microbiology, ecology, plants culturing and plant inoculations, in vitro/in silico/in planta analysis of bacterial PGP traits, bacterial taxonomy, microscopy, study of root colonization and infection processes, genetics, generation of mutants, analysis of symbiotic phenotypes, genomes sequencing, annotation and analysis, ‘omics’ data generation (genomics, transcriptomics, proteomics, metagenomics, metatranscriptomics) and ‘omics’ data analysis (bioinformatics).

Along my scientific career, I have been reviewer of numerous manuscripts for different indexed journals and, in the las years, I have been editor of 3 special issues, and I am currently editor of *Frontiers in Microbiology* and *AIMS Microbiology*. I have been examiner in 7 PhD dissertations. I have organized 2 conferences; I have been member of the scientific committee in 3 and session moderator in 5.

From 2019, I am Secretary of the Quality Committee of the Doctorate program in Microbiology and Genetics and member of the Internationalization Committee of the Research Excellent Unit “Agricultural Production and Environment” (USAL). I have also been part of the working group to get the Human Resources Excellence in Research Award for the U. of Salamanca.

I have numerous international collaborations, most of them contacts made in my more than 3 and a half years of postdoctoral research abroad, as can be noticed in several of my scientific publications.

Regarding my contributions to the society, apart from more than 1000 hours teaching, I participated as researcher in two agreements for the transference of knowledge to the Agricultural sector. I have participated in numerous scientific dissemination activities (Summer Scientific Campus, Scientific Spring, Agricultural Fair SALAMAQ2016 and SALAMAQ2018, European Researchers' Night, Science Week and a weekly radio program of scientific dissemination), I am author of several publications for general public, and I am a scientific advisor of 2 microbial biofertilizer companies.

Finally, I have a master thesis prize, a thesis prize, an accessit to the prize of the council of pharmaceutical colleges and the “V Antonio Palomares Prize” of the Spanish Society of Nitrogen Fixation, awarded to young researchers with relevant contributions in the field of plant-microbial interactions.

Part C. RELEVANT MERITS (*sorted by typology*)

C.1. Publications.. *Ten high-lighted publications in the last 10 years:*

1. Saati-Santamaría, Z., Selem-Mojica, N., Peral-Arenega, E., Rivas, R., **García-Fraile, P.** Unveiling the Genomic Potential of *Pseudomonas* type Strains for Discovering New Natural Products. *Microbial Genomics*. Accepted. 10.1099/mgen.0.000758
2. Saati-Santamaría, Z., Rivas, R., Kolařík, M., & **García-Fraile, P.** 2021. A New Perspective of *Pseudomonas*—Host Interactions: Distribution and Potential Ecological Functions of the Genus *Pseudomonas* within the Bark Beetle Holobiont. *Biology*, 10(2), 164.
3. Saati-Santamaría, Z., Peral-Aranega, E., Velázquez, E., Rivas, R., & **García-Fraile, P.** 2021. Phylogenomic Analyses of the Genus *Pseudomonas* Lead to the Rearrangement of Several Species and the Definition of New Genera. *Biology*, 10(8), 782.
4. González-Dominici, L. I., Saati-Santamaría, Z., & **García-Fraile, P.** 2021. Genome Analysis and Genomic Comparison of the Novel Species *Arthrobacter ipsi* Reveal Its Potential Protective Role in Its Bark Beetle Host. *Microbial ecology*, 81(2), 471-482.

5. Jiménez-Gómez, A., Saati-Santamaría, Z., Kostovcik, M., Rivas, R., Velázquez, E., Mateos, P.F., Menéndez, E. and García-Fraile, P., 2020. Selection of the Root Endophyte *Pseudomonas brassicacearum* CDVBN10 as Plant Growth Promoter for *Brassica napus* L. *Crops. Agronomy*, 10(11), p.1788.
6. Jiménez-Gómez A, Saati-Santamaría Z, Igual JM, Rivas R, Mateos PF, **García-Fraile P**. 2019. Genome insights into the novel species *Microvirga brassicacearum*, a rapeseed endophyte with biotechnological potential. 10.3390/microorganisms7090354
7. Poveda J, Jiménez-Gómez A, Saati-Santamaría Z, Usategui-Martin R, Rivas R, **García-Fraile P**. 2019. Mealworm frass as a potential biofertilizer and abiotic stress tolerance-inductor in plants. *Applied Soil Ecology* 142: 110 – 122
8. Fabryová, A., Kostovčik, M., Díez-Méndez, A., Jiménez-Gómez, A., Celador-Lera, L., Saati-Santamaría, Z., Sechovcová, H., Menéndez, E., Kolařík, M. and **García-Fraile, P.**, 2018. On the bright side of a forest pest-the metabolic potential of bark beetles' bacterial associates. *Science of the Total Environment*, 619, pp.9-17.
9. **García-Fraile P**. Roles of bacteria in the bark beetle holobiont–how do they shape this forest pest?. *Annals of Applied Biology*. 2018 Mar;172(2):111-25.
10. Saati-Santamaría, Z., López-Mondéjar, R., Jiménez-Gómez, A., Díez-Méndez, A., Větrovský, T., Igual, J.M., Velázquez, E., Kolarik, M., Rivas, R. and **García-Fraile, P.**, 2018. Discovery of phloeophagus beetles as a source of *Pseudomonas* strains that produce potentially new bioactive substances and description of *Pseudomonas bohémica* sp. nov. *Frontiers in microbiology*, 9, p.913.

C.2. Congresses

1. Roles of PGP bacteria in the plant holobiont. Keynote. XVII Spanish Congress on Nitrogen Fixation. Madrid, España. 07/2019. Speaker: **García-Fraile, P.**
2. I microrganismi e l'interazione con la pianta ed il terreno. Keynote. I Microrganismi, nuova frontiera dell' Agricoltura sostenibile. Vittoria, Italia. 05/2019. Speaker: **García-Fraile, P.**
3. Boosting microbial biocontrol products by efficient formulations. Keynote. 2nd Biocontrol LATAM Meeting. Medellín, Colombia. 11/2018. Speaker: **García-Fraile, P.**
4. Allelopathic interactions between White Nose Syndrome fungal strains and bacteria isolated from bat's skin and description of *Serratia myotis* and *Serratia vespertilionis* sp. nov. Keynote. BIOPOL Prague, Czech Republic. 05/2015. Speaker: **García-Fraile, P.**
5. External bacterial microbiota of Czech Republic Bats: diversity, pathogenesis potential and interactions with white nose syndrome fungal strains. Keynote speech. BIOCEV Meeting. Vestec, Czech Republic. 05/2015. Speaker: **García-Fraile, P.**

C.3. Research projects

Principal investigator (PI) in 7 research projects/grants/WP (listed below):

1. Modelling integrated biodiversity-based next generation Mediterranean farming systems. Funding entity: PRIMA-AEI. Dates: 2022-2025. Paula García Fraile partner PI (112.500 €) and WP coord.
2. Ref.: PID2019-109960RB-100. Call: Proyectos RETOS I+D+i 2019. Funding entity: Ministerio de Ciencia, Innovación y Universidades. Project title: Análisis de la biodiversidad microbiana funcional con aplicación para la mejora en la producción de arándano y mora. PIs: Rivas, R and García-Fraile, P. Dates: 2020 – 2024. Amount: 170.610€.
3. Ref.: 19-09072S. Call: GACR Senior. Funding Entity: Czech Agency for Science. Project title: Study of the roles of microbial symbionts in the bark beetle holobiont. Beneficiary: Czech Academy of Sciences. PI: García-Fraile, P. Dates: 2019 – 2022. Amount: 280.000€.
4. Ref.: EUIN2017-88199. Call: Europa Investigación. Funding Entity: Spanish Government. Project title: Preparation of an ERC-Consolidator Grant. Beneficiary: University of Salamanca. IP: García-Fraile, P. Dates: 2018 – 2019. Amount: 8.000€.
5. Ref: 750795. Call: H2020-MSCA-IF. Funding Entity: European Commission. Project title: Role of bacterial cellulases in the transition from free living to root endophytes in rapeseed crops and in the design of efficient biofertilizers “BIOFERTICELLULASER”. Beneficiary: University of Salamanca. IP: García-Fraile, P. Dates: 2017 – 2019. Amount: 170.121€.

6. Ref: 16-15293Y. Call: GACR Junior. Funding Entity: Czech Agency for Science. Project title: Factors shaping microbial communities of ecologically important bark beetles. Beneficiary: Czech Academy of Sciences. IP: García-Fraile, P. Dates: 2016 – 2019. Amount: 250.000€.

7. Ref: PTQ-14-07381. Call: Torres Quevedo. Funding Entity: Spanish Government. Project title: Assay and validation of the potential and qualities of the *Tenebrio molitor* frass as biofertilizer, biophytostrengtheners and biopesticide. Beneficiary: MealFood Europe Ltd. IP: García-Fraile, P. Dates: 2016 – 2017. Amount: 90.300€.

C.4. Contracts, technological or transfer merits

➤ Participation in several contract with companies, some of them are highlighted bellow:

1. Selection of a bacterial endophytic Plant Growth Promoting (PGP) strain/consortia of strains with capability to promote canola and tomato and be formulated as plant probiotics. Funding entity: ICL Ltd. PI: Paula García Fraile. 07/05/2021-07/06/2022. 62,387€

2. Control y evolución de la microbiota y el microbioma del jamón ibérico de bellota durante el proceso de curación. Funding entity: Productos Ibéricos de Guijuelo, S.L. PI: Paula García Fraile. 16/07/2020-16/07/2024. 19.421,49 €.

3. Formación al personal de la empresa sobre la taxonomía y mecanismos de promoción del crecimiento vegetal de las bacterias que se pueden utilizar como biofertilizantes en agricultura, así como del diseño de los mismos y los ensayos de campo. Funding entity: Sipcam Iberia S.L. PI: María Encarnación Velázquez. 06/09/2018 - 07/09/2018. 1.000€.

4. Aislamiento, identificación, caracterización, evaluación de actividad in vitro y selección de nuevas cepas endófitas de tomate. Funding entity: Favosa S.L. PI: Raúl Rivas. 09/04/2018-31/12/2019. 60.928€.

5. Desarrollo de un bioestimulante en base a microorganismos endofíticos que ayuden a proteger las plantas frente a estreses abióticos. Funding entity: Agrotecnología S.L. PI: Raúl Rivas González. 01/06/2018 - 01/06/2020. 84.000 €.

6. Desarrollo de un bioestimulante en base a microorganismos endofíticos fijadores y/o movilizadores de nitrógeno. Funding entity: Agrotecnología S.L. PI: Raúl Rivas. 01/06/2018 - 01/06/2020. 80.500 €.

7. Evaluación y determinación microbiana de productos y bacterias empleadas como biofertilizantes. Funding entity: Favosa S.L. PI: Raúl Rivas González. 01/03/2018 - 31/12/2019. 5.300 €.

8. Análisis de sustancias promotoras del desarrollo vegetal producidas por microorganismos concretos e incluidos en productos formulados en base a extractos de algas, melazas y sustancias húmicas. Funding entity: Agrotecnología S.L. PI: Raúl Rivas. 15/09/2017 - 01/10/2018. 11.800 €.

9. Diseño, desarrollo y optimización de un biofertilizante bacteriano multifuncional. Funding entity: Mirat Fertilizantes, S.L. PI: Raúl Rivas González. 01/11/2017 - 30/06/2020. 92.500€.

➤ Author of the patent:

Mezcla de cepas de *Rhizobium leguminosarum* con utilidad como fertilizante en plantas no leguminosas. Encarna Velázquez; Paula García-Fraile; Lorena Carro; Martha Helena Ramírez-Bahena; Pedro F. Mateos-González; Raúl Rivas; Eustoquio Martínez Molina. Priority country: Spain. Nº: 201131656. Publication Date: 2013