



CURRICULUM VITAE (CVA)

IMPORTANT – The Curriculum Vitae cannot exceed 4 pages. Instructions to fill this document are available in the website.

CV date		4/01/2022	
Part A. PERSONAL INFORMATION			
First name	Andrés A.		
Family name	Borges-Rodríguez		
Gender (*)	Male	Birth date (dd/mm/yyyy)	21/05/1966
Social Security, Passport, ID number			
e-mail	aborges@ipna.csic.es	URL Web	https://www.ipna.csic.es/en
Open Research and Contributor ID (ORCID)(*)	0000-0003-4398-2836		

(*) *Mandatory*

A.1. Current position

Position	TISU/Leader of research group on Chemical Plant Defence Activators		
Initial date	2010		
Institution	CSIC (Spanish National Research Council)		
Department/Center	Life & Earth Sciences/Institute of Natural Products and Agrobiology		
Country	Spain	Teleph. number	+34 922 474336
Key words	induced plant resistance, chemical plant defence activators, priming, biotic stress, abiotic stress		

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

Period	Position/Institution/Country/Interruption cause
2010	Técnico Superior Especializado (TISU) CSIC/OPI/Spain
2006-2009	I3P Doctores position/CSIC/Spain
2002-2006	Hired researcher/CSIC/Spain
2001-2002	<i>Postdoc</i> /Rothamsted Research/UK

A.3. Education

PhD, Licensed, Graduate	University/Country	Year
Chemistry Sc degree	University of La Laguna/Spain	1991
Master degree	University of La Laguna/Spain	1994
Chemistry Sc, <i>PhD</i>	University of La Laguna/Spain	1999

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

Dr Borges completed his *PhD* at the IPNA-CSIC and carried out a *postdoc* under the supervision of Prof. John Lucas at the prestigious and worldwide oldest experimental station **Rothamsted Research** (Harpenden, Hertfordshire, UK). Currently, Dr. Borges carries out his research work at IPNA-CSIC, as leader of the **Chemical Plant Defence Activators** research group. The objectives of the group focus on the characterization at physiological, biochemical and molecular levels the defence mechanisms induced by non-toxic chemical compounds capable of inducing a *priming* effect in the plant against biotic and abiotic stresses, such as the water-soluble derivative of vitamin K3 known as menadione sodium bisulphite (MSB). Dr Borges is co-author of **39 publications**, including **14 high impact papers in the last 10 years**. He has participated as part of the research team or as principal investigator in research contracts with agro-industry. He has funded by the Spanish National Research and the Canary Islands Government Research Agencies. At present, he is **principal investigator (PI)** and **Project Manager** of an **EU project**, MAC-INTERREG Programme funded by FEDER funds. In 2014, Dr Borges was **Guest Editor of a topic Induced Resistance for Plant Defence** of the open access journal *Frontiers in Plant Science*, in which twelve high impact papers were published by the most distinguished specialists in this line of research. Dr Borges is inventor of **six patent applications**, **four** of which are currently **licensed** to several **agro-companies** and are being commercially exploited in more than 30 countries. **CSIC's royalty income** has been approximately **700,000€**. Among the two more relevant patent licensing contracts, one of them (patent 2010) is the application of compositions which contain menadione to control the psyllid vectors of HLB, a bacterial citrus disease present in 4 continents and considered to be the greatest threat to this important crop worldwide, and registered in Spain, has been internationally extended to Mexico, Brazil, Chile, South Africa and Australia. Another patent licensing contract (2016) on the use of non-proline cyclic amino acids to increase tolerance to osmotic stress conditions (drought) has been extended to more than 30 countries in addition to Spain, including an EU patent. Dr Borges has **supervised four PhD research projects in the last 10 years** and four **Master degrees**, which have resulted in publications in *Environmental and Experimental Botany*, *Frontiers in Plant Sciences*, *Plant Biotechnology Journal*, *BMC Biology*. Two of these **PhD students have got prestigious fellowships/contracts** such as Marie Curie (David Jiménez-Arias) and a postdoc position in the Sainsbury lab at Cambridge University (Marino Expósito-Rodríguez). He also has supervised a number of international Erasmus+ traineeship students. Last, he has contributed as referee in several high impact journals in Plant Science such as *Plant Biotechnology Journal*, *Frontiers in Plant Science* or *Plants* as well as external reviewer in *PhD* thesis for University of Valencia and Polytechnic University of Valencia; expert for Spanish innovation certification agency (ACIE); project 'evaluator of the Junta de Andalucía and EU project Horizon2020.

Part C. RELEVANT MERITS (sorted by typology)

C.1. Publications: more relevant publications last 10 years; *corresponding author

- Root treatment with a vitamin K3 derivative: a promising alternative to synthetic fungicides against *Botrytis cinerea* in tomato plants Francisco J García-Machado, Ana L García-García, **Andrés A Borges***, David Jiménez-Arias. *Pest Manag Sc* 2021 (in press) <https://doi.org/10.1002/ps.6707>
- A Beginner's Guide to Osmoprotection by Biostimulants (2021) David Jiménez-Arias, Francisco J. García-Machado, Sarai Morales-Sierra, Ana L. García-García, Antonio J. Herrera, Francisco Valdés, Juan C. Luis and **Andrés A. Borges***. *Plants* 2021, 10(2), 363; <https://doi.org/10.3390/plants10020363>
- Rejected brine recycling in hydroponic and thermo-solar evaporation systems for leisure and tourist facilities. Changing waste into raw material (2020) David Jiménez-Arias, Sarai Morales-Sierra, Francisco J. García-Machado, Ana L. García-García, Juan C. Luis, Francisco Valdés, Luisa M. Sandalio, Manuel Hernández-Suárez, **Andrés A. Borges**. *Desalination* 496 (2020) 114443 <https://doi.org/10.1016/j.desal.2020.114443>
- Biostimulant Nanoencapsulation: The New Keystone To Fight Hunger (2020) David Jiménez-Arias, Sarai Morales-Sierra, **Andrés A. Borges**, and David Díaz Díaz. *J. Agric. Food Chem* (in press) <https://dx.doi.org/10.1021/acs.jafc.0c02872>

- Pure Organic Active Compounds Against Abiotic Stress: A Biostimulant Overview (2020) Ana L. García-García, Francisco J. García-Machado, **Andrés A. Borges**, Sarai Morales-Sierra, Alicia Boto and David Jiménez-Arias. *Frontiers in Plant Science* November 2020 | Volume 11 | Article 575829. <https://doi.org/10.3389/fpls.2020.575829>
- David Jiménez-Arias, Francisco J. García-Machado, Sarai Morales-Sierra, Juan C. Luis, Emma Suárez, Mercedes Hernández, Francisco Valdés, and **Andrés A. Borges***. Lettuce plants treated with L-pyrroglutamic acid increase yield under water deficit stress. *Environmental Experimental Botany* 157 (2019): 215-222. <https://doi.org/10.1016/j.envexpbot.2018.10.034>
- **Andrés A. Borges***, Estefanía Carrillo-Perdomo, David Jiménez-Arias, Francisco J. García-Machado, Francisco Valdés-González and Juan C. Luis. The long road to developing novel priming products to increase yield crop under stress. *Plant Tolerance to Environmental Stresses*. Chapter 24, pages 403-413, CRC Press Taylor&Francis Group Publisher 2018. ISBN 9781138559172. <https://www.crcpress.com/Plant-Tolerance-to-Environmental-Stress-Role-of-Phytoprotectants/Hasanuzzaman-Fujita-Oku-Islam/p/book/9781138559172>
- David Jiménez-Arias, Francisco J. García-Machado, Juan C. Luis, Emma Suárez, Sarai Morales-Sierra, Cristina Garrido-Orduña, Antonio J. Herrera, Francisco Valdés, José A. Pérez, Luisa M. Sandalio and **Andrés A. Borges***. Menadione Sodium Bisulphite (MSB): beyond seed-soaking. Root pretreatment with MSB primes salt stress tolerance in tomato plants. *Environmental and Experimental Botany* 157(2019):161-170. <https://doi.org/10.1016/j.envexpbot.2018.10.009>
- Estefanía Carrillo-Perdomo, David Jiménez-Arias, Angel Aller, and **Andrés A. Borges** (2016) Menadione Sodium Bisulphite (MSB) enhances the resistance response of tomato leading to repel mollusc pests. *Pest Management Science* 72:950-960. [10.1002/ps.4074](https://doi.org/10.1002/ps.4074)
- David Jiménez-Arias, **Andrés A. Borges**, Juan C. Luis, Francisco Valdés-González, and José A. Pérez. Priming effect of menadione sodium bisulphite against salinity stress in Arabidopsis involves epigenetic changes in genes controlling proline metabolism. *Environmental Experimental Botany* 120 (2015):23-30. <https://doi.org/10.1016/j.envexpbot.2015.07.003>
- David Jiménez-Arias, José A. Pérez, Juan C. Luis, Vanesa Martín-Rodríguez, Francisco Valdés-González and **Andrés A. Borges***. Treating seeds in menadione sodium bisulphite primes salt tolerance in Arabidopsis by inducing an earlier plant adaptation. *Environmental Experimental Botany* 109 (2015) 23-30. [10.1016/j.envexpbot.2014.07.017](https://doi.org/10.1016/j.envexpbot.2014.07.017)
- **Andrés A. Borges***, David Jiménez-Arias, Marino Expósito-Rodríguez, Luisa M. Sandalio and José A. Pérez. Priming crops against biotic and abiotic stresses: MSB as a tool for studying mechanisms. *Frontiers in Plant Science* 5 (2014) 642. <https://doi.org/10.3389/fpls.2014.00642>

C.2. Congress

- *Symposium "Agriculture and Food Sustainability: New Climate Change Scenarios*, Funchal, Madeira (Portugal), October 11-13th, 2021; Organizer: University of Madeira; **Title**: Root treatment with menadione sodium bisulfite induces resistance against Botrytis cinerea in tomato plants: A sustainable fungicide alternative (oral presentation)
- *XIV International Plant Water Relations Symposium*, Madrid October 3-5th, 2018; Organizer: Sociedad Española de Fisiología Vegetal; **Title**: Pre-treatment with L-pyrroglutamic acid induces drought tolerance in lettuce (oral presentation)
- *XXII Reunión de la Sociedad Española de Fisiología Vegetal and XV Congreso Hispano- Luso de Fisiología Vegetal*, Barcelona June 26-29th, 2017; **Title**: Priming effect of menadione sodium bisulphite against salinity stress in Arabidopsis involves epigenetic changes in genes controlling proline metabolism (oral presentation)
- *PR Proteins and Induced Resistance against Pathogens and Insects: Prime time for induced resistance*, Aachen, Germany 2015; **Title**: Menadione Sodium Bisulphite

(MSB) enhances the resistance response of tomato leading to repel mollusc pests
(poster)

C.3. Research projects

- ◇ Title: *Preparation of antimicrobial peptides for use in human health and agriculture*; Funding: Plan Nacional-Retos de la Sociedad (SAF2013-48399-R); Funding: 145.000€; Participation: research team. Date Start-End: 2014-2017
- ◇ Title: *Exploitation of brines from desalination processes in non-soil cultivation systems for application to the hotel sector*; Funding: Fundación Cajacanarias (2016TRU02); 36.000€; Participation: Principal investigator; Date Start-End: 2017-2019
- ◇ Title: *Contribution to water saving in strategic crops for the primary sector in the Canary Islands and Madeira through the application of bioactive natural products and extracts with osmoprotective properties (MAC2/1.1b/279)* Funding: FEDER funds, 576.400,40€; Participation: Principal investigator; Date Start-End: 2019-2022
- ◇ Title: *Comprehensive study of plant defence induced by exogenous application of fluorescent derivatives of MSB, vitamin K3 and sodium bisulphite (ProID2020010082)* Funding: FEDER; 67.000€ Participation: research team; Date Start-End: 2020-2022

1. C.4. Contracts, technological or transfer merits

C.4.1 Patent applications:

1. **WO2017158225A1** *Use of cyclic non-prolinic amino acids to increase plant tolerance to osmotic stress conditions*; Holder: CSIC (60%), University of La Laguna (40%); PCT: EU, Brazil, India, Mexico, Morocco, Peru, South Africa, Turkey, Egypt; Status: **Licensed**
2. **WO2012045901A2** *Compositions for the control of the pests Trypza and Diaphorina citri, vectors of the bacterium of the genus Candidatus Liberibacter, the causal agent of the most serious citrus disease known as Huanglongbing (HLB)*; Holder: CSIC; PCT: Australia, Brazil, Chile, Mexico and Spain; Status: **Licensed**
3. **WO2010018281A1** *Use of menadione for inducing tolerance against salt stress*; Registry: Spain; Status: **Licensed**
4. **WO2009024634A1** *Use of compositions containing menadione and / or one or more of its water-soluble derivatives in order to induce in the treated crops an improvement of its fruits to handling and transport*; Registry: Spain; Status: **Licensed**

C.4.2 Contracts

Technological Support Contract. Subproject CDTI company Biovert, SA BIOVERT, SA. Principal Investigator: Andrés A. Borges Rodríguez. 2013-2014. Budget: 14,000 €.

Collaboration Agreement between the CSIC and Fundación CajaCanarias for the study of Chemical Activators of Plant Defences. Principal Investigator: A. Borges Rodríguez. 2006-2009. Budget: 42,000 €.