

Part A. PERSONAL INFORMATION

CV date 14/01/2020

First and Family name	Antonio Díaz Espejo		
Social Security, Passport, ID number	26223264K	Age	47
Researcher numbers	Researcher ID	B-5361-2008	
	Orcid code	0000-0002-4711-2494	

A.1. Current position

Name of University/Institution	IRNAS-CSIC		
Department	Protection of the system soil-plant-water		
Address and Country			
Phone number	954624711	e-mail	a.diaz@csic.es
Current position	Tenured Scientist	From	19/07/2008
Cód. UNESCO	310205 Irrigation; 241719 Plant Physiology; 251112 Soil Physic; 310305 Crops; 250203 Bioclimatology		
Palabras clave	Water stress, Plant Ecophysiology, plant-based water stress indicators, ecophysiological models, stomatal conductance, photosynthesis		

A.2. Education

PhD	University	Year
Biology degree	Seville	1996
Biology PhD	Seville	2000

A.3. JCR articles, h Index, thesis supervised...

Artículos SCI	76
Índice h	32 (según WOK, 14/01/20))
Total Citations	4116
Citation/ per year (last 5 years)	356
Number of citations per paper	54
Nº papers SCI / year (last 5 years)	5
Highlighted papers	7 Highly Cited, 3 Hot Papers
Research Projects	17
Contracts with companies	15
PhDs	3 (+2 on-going)

Part B. CV SUMMARY (max. 3500 characters, including spaces)

RESEARCH ACHIEVEMENTS OTHER THAN RESEARCH OUTPUTS:

I have been invited to 6 presentations in International Congress and I have organized three International congress on Plant Water Relations, Sap Flow and Deficit Irrigation. In addition to participate in 16 research projects (of which I lead 9 as Principal Investigator), I have lead also 15 contracts with companies to optimise the use of water in agricultural by using process-based models with physiological background.

RESEARCH IMPACT RELATIVE TO OPPORTUNITY, IN CONTEXT OF DISCIPLINE/END USER BENEFITS:

My 69 papers have been cited over 3015 times and I have an h-index of 27 according to IS-Web. 6 of these papers are Highly Cited in Plant Sciences according to ISI Web of Science and 2 of them were Hot Papers. My work focuses in the regulation of leaf gas exchange under

water stress conditions in semiarid regions. The final goal of my research is to provide to farmers and managers with effective, friendly and robust tools which can assess them when taking decisions on irrigation or management of the crop, for instance pruning and fertirrigation. In order to achieve so, two research lines have been set:

- 1) use of plant-based sensors to characterize the level of water stress of the crop.
- 2) ecophysiology of water stress.

Both lines of research complement each other nicely, and we propose that currently it is compulsory a combination of process-based models and plant-based sensors to correctly manage water stress in deficit irrigation strategies.

I think that what makes me different for the scientific community is that despite having as main goal the optimisation of water in agriculture, which is a very applied goal, I have approached it from a very physiological perspective.

Part C. RELEVANT MERITS

C.1. Publications

- Franco-Navarro JD, Rosales MA, Cubero-Font P, Calvo P, Álvarez R, Diaz-Espejo A, Colmenero-Flores JM. 2019. Chloride as macronutrient increases water use efficiency by anatomically-driven reduced stomatal conductance and increased mesophyll diffusion to CO₂. *Plant Journal*, 99, 815–831.
- Rodriguez-Dominguez C.M., Hernandez-Santana V., Buckley T.N., Fernández J.E., Diaz-Espejo A. 2019. Sensitivity of leaf turgor to air vapour pressure deficit correlates with maximum stomatal conductance. *Agricultural and Forest Meteorology*, 272 - 273: 156 - 165.
- V. Hernandez-Santana, P. Diaz-Rueda, A. Diaz-Espejo, M.D. Raya-Sereno, S. Gutiérrez-Gordillo, A. Montero, A. Perez-Martin, J.M. Colmenero-Flores & C.M. Rodriguez-Dominguez. (2019). Hydraulic traits emerge as relevant determinants of growth patterns in wild olive genotypes under water stress. *Frontiers in Plant Science*, 10: 1 - 15. 2018
- Hernandez-Santana, V, Fernandes, R.D.M., Perez-Arcoiza A., Fernández, J.E., Garcia, J.M., Diaz-Espejo, A. 2018. Relationships between fruit growth and oil accumulation with simulated seasonal dynamics of leaf gas exchange in the olive tree. *Agricultural and Forest Meteorology*, 256-257: 458-469.
- Diaz-Espejo A, Hernandez-Santana V. 2017. The phloem-xylem consortium: until death do them part. *Tree Physiology*, 37: 847-850
- Rodriguez-Dominguez CM, Buckley TN, Egea G, de Cires A, Hernandez-Santana V, Martorell S, Diaz-Espejo A. 2016. Most stomatal closure in moderate drought can be explained by stomatal responses to leaf turgor. *Plant, Cell and Environment*, 36: 725-735, doi: 10.1111/pce.12774.
- Flexas, J; Diaz-Espejo, A; Conesa, M; Coopman, R; Douthe, C; Gago, J; Gallé, A; Galmes, J; Medrano, H; Ribas-Carbo, M; Tomás, M; Niinemets, Ü. 2016. Mesophyll conductance to CO₂ and Rubisco as targets for improving intrinsic water use efficiency in C3 plants. *Plant, Cell and Environment*, 39: 965-982, doi: 10.1111/pce.12622
- Hernandez-Santana, V., Rodriguez-Dominguez, C.M., Fernandez, J.E., Diaz-Espejo, A. 2016. Role of leaf hydraulic conductance in the regulation of stomatal conductance in almond and olive in response to water stress. *Tree Physiology*, 36: 725-735, doi 10.1093/treephys/tpv146.
- Hernandez-Santana, V., Fernandez, J.E., Rodriguez-Dominguez, C.M., Romero R., Diaz-Espejo, A. 2016. The dynamics of radial sap flux density reflects changes in stomatal conductance in response to soil and air water deficit. *Agricultural and Forest Meteorology*, 218: 92-101, doi: 10.1016/j.agrformet.2015.11.013.
- Flexas, J, Diaz-Espejo, A. 2015. Interspecific differences in temperature response of mesophyll conductance: food for thought on its origin and regulation. *Plant, Cell and Environment*, 38, 625 – 628
- Buckley TN, Diaz-Espejo A. 2015. Partitioning changes in photosynthetic rate into contributions from different variables. *Plant, Cell and Environment*, 38: 1200–1211, DOI: 10.1111/pce.12459
- Buckley TN, Díaz-Espejo A. 2015. Reporting estimates of maximum potential electron transport rate. *New Phytologist*, 205: 14-17 DOI: 10.1111/nph.13018

- Torres-Ruiz J.M., A. Diaz-Espejo, A. Perez-Martin, V. Hernandez-Santana. 2014. Role of hydraulic and chemical signals in leaves, stems and roots in the stomatal behaviour of olive trees under water stress and recovery conditions. *Tree Physiology*, 35: 415-424, doi:10.1093/treephys/tpu055
- Buckley T.N., S. Martorell, A. Diaz-Espejo, M. Tomás, H. Medrano. 2015. Is stomatal conductance optimised over both time and space in plant crowns? A field test in grapevine (*Vitis vinifera*). *Plant, Cell and Environment*, 37: 2707–2721, doi: 10.1111/pce.12343
- Perez-Martin A., C. Michelazzo, J.M. Torres-Ruiz, J. Flexas, J.E. Fernández, L. Sebastiani, A. Diaz-Espejo. 2014. Regulation of photosynthesis, stomatal and mesophyll conductance under water stress acclimation and recovery in olive trees: correlation with gene expression of carbonic anhydrase and aquaporins. *Journal of Experimental Botany*, 65: 3143-3156
- Diaz-Espejo. 2013. New challenges in modeling photosynthesis: temperature dependencies of Rubisco kinetics. *Plant, Cell and Environment*, 36: 2104-2107
- Martorell S., Antonio Diaz-Espejo, Hipólito Medrano, Marilyn C. Ball, Brendan Choat. 2014. Rapid hydraulic recovery in *Eucalyptus pauciflora* after drought: linkages between stem hydraulics and leaf gas exchange. *Plant, Cell and Environment*, 37: 617–626. doi: 10.1111/pce.12182.
- Egea G., Gonzalez-Real MM, Baille A, Nortes PA, Diaz-Espejo A. 2011. Disentangling the contributions of ontogeny and water stress to photosynthetic limitations in almond trees. *Plant, Cell and Environment*, 34: 962-979
- Perez-Martin A, Flexas J, Ribas-Carbó M, Bota J, Tomás M, Infante JM, Diaz-Espejo A. 2009. Interactive effects of soil water deficit and air vapour pressure deficit on mesophyll conductance to CO₂ in olives and grapevines. *Journal of Experimental Botany*, 60: 2391-2405
- Flexas J, Ribas-Carbó M., Diaz-Espejo A, Galmés J & Medrano H. 2008. Mesophyll conductance to CO₂: current knowledge and future prospects. *Plant, Cell and Environment*: 31, 602–621
- Flexas J, Diaz-Espejo A, Galmés J, Kaldenhoff R, Medrano H, Ribas-Carbo M. 2007. Rapid variations of mesophyll conductance in response to changes in CO₂ concentration around leaves. *Plant Cell and Environment* 30:1284-1298
- Diaz-Espejo A, Nicolás E & Fernández JE. 2007. Seasonal evolution of diffusional limitations and photosynthetic capacity in olive under drought. *Plant, Cell and Environment* 30: 922-933.
- Flexas J, Ortuño MF, Flórez-Sarasa ID, Diaz-Espejo A, Medrano H & Ribas-Carbo M. 2007. Mesophyll conductance to CO₂ in *Arabidopsis thaliana*. *New Phytologist* 175: 501–511
- Flexas J, Díaz-Espejo A, Berry JA, Cifre J, Galmés J, Kaldenhoff R, Medrano H & Ribas-Carbó M. 2007. Analysis of leakage in IRGA's leaf chambers of portable open gas exchange systems: quantification and its effects in photosynthesis parameterization. *Journal of Experimental Botany* 58: 1533–1543.
- Diaz-Espejo A, Walcroft A, Fernández JE, Hafidi B, Palomo MJ & Girón IF. 2006. Modelling photosynthesis in olive leaves under drought conditions. *Tree Physiology* 26:1445–1456
- Diaz-Espejo A, Verhoef A, Knight R. 2005. Illustration of micro-scale advection using grid-pattern mini-lysimeters. *Agricultural and Forest Meteorology*, 129: 39-52

C.2. Research projects and grants

- Mecanismos fisiológicos de control de la transpiración y la fotosíntesis en el olivo y la vid y su relación con la adaptación a la sequía y al riego de recuperación. Bases para la mejora de la eficiencia del uso del agua en estos cultivos y la optimización del riego deficitario. (AGL2005-00220/AGR) 2006-2008. 85.680 euros IP: A Díaz Espejo
- Consecuencias del control estomático de la transpiración en árboles frutales con riego deficitario ocasionado por las limitaciones impuestas por la conductividad hidráulica del sistema suelo-planta y las señales hormonales desde raíces. Desarrollo de un modelo mecanístico integrador. AGL2009-11310/AGR 2010-2012 180.000 euros IP: A Díaz Espejo
- Riego deficitario controlado del olivar de alta densidad: programación automática basada en la fisiología de la planta y en la economía de manejo del cultivo. AGL2012-34544. 2013-2015 120.000 euros IP: JE Fernández Luque
- Bases fisiológicas del equilibrio entre la carga de frutos y el área foliar en olivares en seto. AGL2015-71585-R. 2016- 2018 165.000 euros IPs: A Díaz Espejo & JE Fernández Luque

- Operationalizing the increase of water use efficiency and resilience in irrigation (OPERA) European project ERA-NET JPI-Waterworks, PCIN-2017-002 2017-2019. 133.000 euros (total 1.075.098 euros para 8 partners). COORDINATOR: Marius Heinen Workpackage Leader: Antonio Diaz-Espejo
- Fundamentos fisiológicos de un nuevo método para el manejo del riego deficitario en frutales MICINN, Programa I+D, RTI2018-098961-B-I00. Enero 2019-Diciembre 2021. 175.450 euros IPs: Antonio Díaz Espejo y José Enrique Fernández Luque

C.3. Contracts (as PI)

- Effect of Pyraclostrobin on gas exchange of grapevines under field conditions. BASF Española S.A. Abril 2006 - Diciembre 2006 24.019 euros
- Investigación y asesoramiento de interpretación de sensores en plantas para la optimización del riego y nutrición en el cultivo de viña y tomate. Verde-Smart Corporación S.L. Ref. VAPC 20135588. Diciembre 2013 - Junio 2015 72.529,82 euros
- Puesta a punto de un modelo que permita cuantificar el porcentaje de limitación de fotosíntesis en cultivos de riego deficitario de viña Tinta causado por estrés climático e hídrico. Bodegas Emilio Moro S.L. Ref. VAPC 20141652. 28 Febrero 2014 - Abril 2015 38.720 euros
- Análisis de ácido abscísico en hojas de maíz e interpretación de datos de sondas Zim de turgencia en hojas de maíz. BASF Española S.L. Ref. VAPC 20142054. 22 Abril 2014 - 30 Noviembre 2014 49.610 euros
- Desarrollo de un modelo mecanístico de fotosíntesis para especies hortícolas en invernadero en función de variables microclimáticas. TECNOVA S.L. Ref. VAPC 20158208. 1 Marzo 2015 - 31 Diciembre 2015 18.150 euros
- Physiological interpretation of the read outs of ZIM probes in the field. BASF Española S.L. Ref. VAPC 20158875. 1 Marzo 2015 - 30 Octubre 2015 116.765 euros
- Physiological interpretation of stress levels in corn in the field at different developmental stage. BASF Española S.L. Ref. VAPC 20162467. 30 Abril 2016 - 31 Diciembre 2016 67.500 euros
- Physiological interpretation of stress levels in corn in the greenhouse. BASF Española S.L. Ref. VAPC 20163711. 15 Junio 2016 - 30 Noviembre 2016 24.625 euros
- TERRA ACQUA: Estrategias para potenciar la síntesis de compuestos saludables en el olivar. Cortijo de Gadiana S.L. Ref. VAPC 20164884. 1 Julio 2016 - 30 Abril 2019 30.000 euros
- Adaptación a los modelos fisiológicos de integración de sensores en planta y clima para la optimización de riego. Ayscom S.L. Ref. VAPC 20165573 1 Junio 2016 - 31 Diciembre 2016 12.000 euros
- Continuous and automatic measurement of stomatal conductance in intact maize plants and photosynthesis modelling. BASF Española S.L. Ref. VAPC 20166086. 1 Octubre 2016 - 31 Marzo 2017 36.000 euros

C.4, C.5, C.6, C.7... (e. g., Patents, Institutional responsibilities, memberships, ...)

- Editorial Review Board of Plant, Cell & Environment and Tree Physiology.
- Member of the Scientific Committee of Workshop Mesophyll Conductance to CO₂: mechanisms, modelling and ecological implications, held between 27-30 September 2008 in Sa Coma, Mallorca.
- Member of the Scientific Committee of 7th International Workshop on Sap Flow, held between 21 and 24 October 2008 in Sevilla, Spain.
- Member of the Scientific Committee of Symposium on Water Use in a Changing Climate, included in the XXVIII International Horticultural Congress - IHC2010, Lisbon, el 22-27 de august 2010. (www.ihc.2010.org)
- 2012, 2014. Member of the expert pannel of the program "Ramón y Cajal" and "Juan de la Cierva" for the ANEP, Spain.
- 2016-2018. Evaluator of the program AgreenSkills+ for the INRA, France
- 2016-present. Evaluator of research projects of Research Foundation - Flanders (FWO), Belgium. Currently member of the expert panel in BIO section for the FWO.
- Researcher-in-chief of the Scientific-Technical Service for Plant Ecophysiology at IRNAS-CSIC since 2017 (ISO 9001).