Curriculum Vitae: Cristina Cruz

1. Personal data

Full name:	**Cristina** Maria Nobre Sobral de Vilhena da **Cruz** Houghton
Date and place of birth:	1964, Lisbon, Portugal
Nationality:	Portuguese
Academic degrees:	PhD in Plant Ecology and Systematics from University of Lisbon Bachelor's degree in Biology from University of Lisbon
Functions	1994 – Present: Lecturer in Plant Biology at the Faculty of Sciences of the University of Lisbon (FCUL); Researcher in the University's Centre for Ecology, Evolution and Environmental Changes (CE3C).
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2. Area of scientific activity

I am interested in the physiological mechanisms that determine the suitability of terrestrial plants to their environments, especially in environments rich in ammonium.

My main scientific interest is the physiological ecology of N acquisition and impacts of increased N availability in terrestrial plants. The distinct effects of NO_3^- and NH_4^+ on plant performance and species preference for one of these chemical species of N have been a constant in my research. I am examining the role of plant N fluxes in several key areas: ecological succession, primary productivity, carbon nitrogen interactions, physiology of inorganic nitrogen assimilation and the role of plant micro-organism interactions in nitrogen acquisition. Special attention is given to rhizospheric microbial consortia (free living N fixers, phosphate solubilizers and arbuscular mycorrhizal fungi) in nitrogen acquisition, the mechanisms and fluxes involved are part of the research programme.

My current research is driven by three overarching objectives:

1. to maintain long-term ecological experiments in order to collect data on the response of Mediterranean ecosystems to changes in resource availability over time and space;
2. to understand the role of soil ecology on plant productivity and sustainability of eco- and agro-systems;
3. to engineer the rhizosphere of crop plants in order to obtain plants tolerant of higher stresses, with increased nutrient use efficiencies and nutritional value.

The approach is highly multidisciplinary, ranging from biochemical processes to field ecological analyses. Techniques include enzymatic kinetics, net flux kinetics, ionic and metabolic profiling of tissues, and growth analysis. The biological systems used are carob (*Ceratonia siliqua* L.), *Arabidopsis thaliana* and in vitro AMF cultures. New projects are considering the physiology of the endophyte *Piriformospora indica* and its application as a biofertilizer in order to maintain food security and environmental sustainability.

3. Participation in research projects

2016-2019: "BioClub - Designing biofertilizers by mimicking plants' recruitment of rhizospheric partners". PTDC/AGR-PRO/1852/2014. Coordinator.

2016-2019: "BIOINVENT - Generic bio-inventory of functional soil microbial diversity in permanent grassland ecosystems across management and climate gradients". Participant.

2012-2014: "Adaptive Genotype-Phenotype Mapping for semi-automated gene network construction, and a principled approach to large-scale biological pathway discovery in health and disease". National Science Foundation. Participant and Portuguese coordinator.

2012-2013: "Estudio de la respuesta del metabolismo del nitrógeno en plantas de interés agronómico ante la nutrición amoniacal a través de su composición de isotopos estables ($^{15}N/^{14}N$)" within the second ANABASID Programme. Post-doctoral mobility grant to Dr. Idoia Ariz Arnedo (DNI 72702885T). Coordinator.

2012-2014: "Role of enzymatic activity in lichen tolerance under nitrogen excess". FP7-2010-IEF-274750- Real Tune. Marie Curie grant to Silvana Munzi. Coordinator.

2011-2014: "In-nitro: conceptualizing the effects of increased nitrogen availability in a Mediterranean ecosystem". PTDC/BIA-ECS/122214/2010. Coordinator.

2012-2014: "Alta irradiancia y nutrición amoniacal en plantas. Movilidad y Atracción del Talento Investigador". Ministry of Education, Spain. Participant.

2011-2014: "Rhizospheric microbial consortia to increase nutrient use efficiency. A tool to be used in intensive farm systems". PTDC/AGRO-PRO/115888/2009. Coordinator

2010-2013: "Spheres of ecosystem responses to nitrogen (SERN). A case study in a Mediterranean-type ecosystem in southern Portugal". PTDC/BIA-BEC/099323/ 2008. Coordinator.

2010-2011: "Human and plant immunity: differences and possible applications". IMM. Project 201100031. Participant.

2009-2012: "Cultivation of Pineapple in the Azores: Research, Development and Application of Technologies and Practices to Improve Competitiveness and Quality of Production". RAAFDR-01-0482-FEDER-000003. Participant.

2009-2011: "Path Planning Strategies Inspired by Swarm Behaviour of Plant Root Apexes". Ariadna ID: 09/6401. Advanced Concepts Team, European Space Agency. Participant.

2008-2011: 7th Programme Framework. Expert in the evaluation of the proposals presented to the "Call" KBBE 2007 2A and the progress reports of approved projects.

2008-present: "European Nitrogen Assessment". Participant as an expert on nitrogen turnover in terrestrial ecosystems.

2008-present: "COST Action FP0803 Belowground carbon turnover in European forests". COST National Coordinator for Portugal.

2007 - 2010: "Study of the effects of water stress on the bioenergetic processes in plants and their survival, using mutants of the alternative oxidase of Arabidospsis". PTDC/AGR-AAM/69614/2006. Participant.

2006-present: "Nitroeurope - The nitrogen cycle and its influence on the European greenhouse gas balance". Participant.

2006-present: "COST Action 729 – Nitrogen in the atmosphere". Participant.

2004-2010: "Comparative ecological implications of nitrate and ammonium availabilities in Mediterranean ecosystems". POCTI/BIA-BDE/59183/2004. Coordinator.

2001-2005: "Soil nitrogen availability over succession in Mediterranean ecosystems. Temporal dynamics and spatial heterogeneity of nitrogen availability in Mediterranean soils during ecological succession". POCTI/39230/BSE/2001. Coordinator.

4. Publications

4.1 Publications in scientific journals with impact factor

Bertolazi AA, de Souza SB, Ruas KF, Campostrini E, de Rezende CE, **Cruz C**, Melo J, Colodete CM, Varma A, Ramos AC. Inoculation with *Piriformospora indica* is more efficient in wild-type rice than in transgenic rice over-expressing the vacuolar H^+-PPase. Frontiers in Microbiology. 2019;10:1087. DOI:10.3389/fmicb.2019.01087 (IF 4.019).

Hessini K, Issaoui K, Ferchichi S, Abdelly C, Siddique KHM, **Cruz C**. Interactive effects of salinity and nitrogen forms on plant growth, photosynthesis and osmotic adjustment in maize. Plant Physiology and Biochemistry. 2019;139:171-178. DOI:10.1016/j.plaphy.2019.03.005 (IF 2.718).

Mahmoudi N, **Cruz C**, Mahdhi M, Mars M, Caeiro MF. Arbuscular mycorrhizal fungi in soil, roots and rhizosphere of *Medicago truncatula*: diversity and heterogeneity under semi-arid conditions. PeerJ. 2019;7:e6401. DOI:10.7717/peerj.6401 (IF 2.118).

Munzi S, Branquinho C, **Cruz C**, Máguas C, Leith I, Sheppard L, Sutton M. $\delta^{15}N$ in lichens reflects the isotopic signature of ammonia source. Science of the Total Environment. 2019;653:698-704. DOI:10.1016/j.scitotenv.2018.11.010 (IF 4.61).

Munzi S, **Cruz C**, Corrêa A. When the exception becomes the rule: An integrative approach to symbiosis. Science of The Total Environment. 2019;672:855-861. DOI:10.1016/j.scitotenv.2019.04.038 (IF 4.61).

Ulm F, Avelar D, Hobson P, Penha-Lopes G, Dias T, Máguas C, **Cruz C**. Sustainable urban agriculture using compost and an open-pollinated maize variety. Journal of Cleaner Production. 2019;212:622-629. DOI:10.1016/j.jclepro.2018.12.069 (IF 5.651).

Ariz I, Boeckstaens M, Gouveia C, Martins AP, Sanz-Luque E, Fernández E, Soveral G, von Wirén N, Marini AM, Aparicio-Tejo PM, **Cruz C**. Nitrogen isotope signature evidences ammonium deprotonation as a common transport mechanism for the AMT-Mep-Rh protein superfamily. Science Advances. 2018;4:eaar3599. DOI:10.1126/sciadv.aar3599 (IF 11.51).

Dias T, Correia P, Carvalho L, Melo J, de Varennes A, **Cruz C**. Arbuscular mycorrhizal fungal species differ in their capacity to overrule the soil's legacy from maize monocropping. Applied Soil Ecology. 2018;125:177-183. DOI:10.1016/j.apsoil.2017.12.025 (IF 2.786).

Melo J, Carvalho L, Correia P, Bastos de Souza S, Dias T, Santana M, Carolino M, Aguiar NO, Canellas LP, **Cruz C**, Ramos AC. Conventional farming disrupts cooperation among phosphate solubilising bacteria isolated from *Carica papaya*'s rhizosphere. Applied Soil Ecology. 2018;124:284-288. DOI:10.1016/j.apsoil.2017.11.015 (IF 2.786).

Rai A, Cherif A, Cruz C, Nabti E. Extracts from seaweeds and *Opuntia ficus-indica* cladodes enhance diazotrophic-PGPR halotolerance, their enzymatic potential, and their impact on wheat germination under salt stress. Pedosphere. 2018;28:241-254. DOI:10.1016/S1002-0160(17)60333-3 (IF 1.734).

Dias T, Crous CJ, Liberati D, Munzi S, Gouveia C, Ulm F, Afonso AC, Ochoa-Hueso R, Manrique E, Sheppard L, Martins-Loução MA, Bernardes da Silva A, **Cruz C**. Alleviating nitrogen limitation in Mediterranean maquis vegetation leads to ecological degradation. Land Degradation & Development. 2017;28:2482–2492. DOI:10.1002/ldr.2784 (IF 9.787).

Fonseca MB, Dias T, Carolino MM, França MGC, **Cruz C**. Belowground microbes mitigate plant-plant competition. Plant Science. 2017;262:175-181. DOI:10.1016/j.plantsci.2017.06.006 (IF 3.437).

Hessini K, Kronzucker HJ, Abdelly C, **Cruz C**. Drought stress obliterates the preference for ammonium as an N source in the C4 plant *Spartina alterniflora*. Journal of Plant Physiology. 2017;213:98-107. DOI:10.1016/j.jplph.2017.03.003 (IF 2.97).

Munzi S, **Cruz C**, Maia R, Máguas C, Perestrello-Ramos MM, Branquinho C. Intra- and inter-specific variations in chitin in lichens along a N-deposition gradient. Environmental Science and Pollution Research. 2017;24:28065-28071. DOI:10.1007/s11356-017-0378-3 (IF 2.741).

Munzi S, Sheppard LJ, Leith ID, **Cruz C**, Branquinho C, Bini L, Gagliardi A, Cai G, Parrotta L. The cost of surviving nitrogen excess: energy and protein demand in the lichen *Cladonia portentosa* as revealed by proteomic analysis. Planta. 2017;245:819-833. DOI:10.1007/s00425-017-2647-2 (IF 3.239).

Ochoa-Hueso R, Munzi S, Alonso R, Arróniz-Crespo M, Avila A, Bermejo V, Bobbink R, Branquinho C, Concostrina-Zubiri L, **Cruz C**, Cruz de Carvalho R, De Marco A, Dias T,

Elustondo D, Elvira S, Estébanez B, Fusaro L, Gerosa G, Izquieta-Rojano S, Lo Cascio M, Marzuoli R, Matos P, Mereu S, Merino J, Morillas L, Nunes A, Paoletti E, Paoli L, Pinho P, Rogers IB, Santos A, Sicard P, Stevens CJ, Theobald MR. Ecological Impacts of Atmospheric Pollution and Interactions with Climate Change in Terrestrial Ecosystems of the Mediterranean Basin: Current Research and Future Directions. Environmental Pollution. 2017;227:194-206. DOI:10.1016/j.envpol.2017.04.062 (IF 4.839).

Santana MM, Gonzalez JM, **Cruz C**. Nitric Oxide Accumulation: The Evolutionary Trigger for Phytopathogenesis. Frontiers in Microbiology. 2017;8:1947. DOI:10.3389/fmicb.2017.01947 (IF 4.076).

Ulm F, Gouveia C, Dias T, **Cruz C**. N fertilization in a Mediterranean ecosystem alters N and P turnover in soil, roots and the ectomycorrhizal community. Soil Biology and Biochemistry. 2017;113:60-70. DOI:10.1016/j.soilbio.2017.05.028 (IF 4.152).

Ulm F, Hellmann C, **Cruz C**, Máguas C. N/P imbalance as a key driver for the invasion of oligotrophic dune systems by a woody legume. Oikos. 2017;126:231-240. DOI:10.1111/oik.03810 (IF 3.586).

Ulm F, Jacinto J, **Cruz C**, Máguas C. How to outgrow your native neighbour? Belowground changes under native shrubs at an early stage of invasion. Land Degradation & Development. 2017;28:2380–2388. DOI:10.1002/ldr.2768 (IF 9.787).

Canton GC, Bertolazi AA, Cogo AJD, Eutrópio FJ, Melo J, Souza SB, Krohling CA, Campostrini E, Silva AG, Façanha AR, Sepúlveda N, **Cruz C**, Ramos AC. Biochemical and ecophysiological responses to manganese stress by ectomycorrhizal fungus *Pisolithus tinctorius* and in association with *Eucalyptus grandis*. Mycorrhiza. 2016;26:475-487. DOI:10.1007/s00572-016-0686-3 (IF 3.459).

Esteban R, Ariz I, **Cruz C**, Moran JF. Review: Mechanisms of ammonium toxicity and the quest for tolerance. Plant Science. 2016;248:92-101. DOI:10.1016/j.plantsci.2016.04.008 (IF 3.607).

Godinho DP, Janssen A, Dias T, **Cruz C**, Magalhães S. Down-regulation of plant defence in a resident spider mite species and its effect upon con- and heterospecifics. Oecologia. 2016;180:161-167. DOI:10.1007/s00442-015-3434-z (IF 3.093).

Hamouda I, Badri M, Mejri M, Ferchichi S, **Cruz C**, Siddique KHM, Hessini K. Salt tolerance of Beta macrocarpa is associated with efficient osmotic adjustment and increased apoplastic water content. Plant Biology. 2016;18:369–375. DOI:10.1111/plb.12419 (IF 2.633).

Melo J, Carolino M, Carvalho L, Correia P, Tenreiro R, Chaves S, Meleiro AI, de Souza SB, Dias T, **Cruz C**, Ramos AC. Crop management as a driving force of plant growth promoting rhizobacteria physiology. SpringerPlus. 2016;5:1574. DOI:10.1186/s40064-016-3232-z (IF 0.982).

Munzi S, **Cruz C**, Selosse MA, Rodriguez R. Symbiotic lifestyle - 8th International Symbiosis Society (ISS) congress, Lisbon (Portugal), 12–18 July 2015. Symbiosis. 2016;68:1-3. DOI:10.1007/s13199-016-0393-z (IF 1.438).

Rainha N, Medeiros VP, Câmara M, Faustino H, Leite JP, Barreto MC, **Cruz C**, Pacheco CA, Ponte D, Bernardes da Silva A. Plasticity of Crassulacean Acid Metabolism at subtropical

latitudes: the pineapple case study. Physiologia Plantarum 2016;156:29-39. DOI:10.1111/ppl.12386 (IF 3.138).

Rainha N, Medeiros VP, Ferreira C, Raposo A, Leite JP, **Cruz C**, Pacheco CA, Ponte D, Silva AB. Leaf malate and succinate accumulation are out of phase in the CAM plant *Ananas comosus*. Plant Physiology and Biochemistry. 2016;100:47-51. DOI:10.1016/j.plaphy.2015.12.021 (IF 2.756).

Ariz I, **Cruz C**, Neves T, Irigoyen JJ, García C, Nogués S, Aparicio-Tejo PM and Aranjuelo I. Leaf $\delta^{15}N$ as a physiological indicator of the responsiveness of N_2-fixing alfalfa plants to elevated [CO_2], temperature and low water availability. Frontiers in Plant Science. 2015;6:574. DOI:10.3389/fpls.2015.00574 (IF 3.9).

Corrêa A, **Cruz C**, Ferrol N. Nitrogen and Carbon/Nitrogen dynamics in arbuscular mycorrhiza: the great unknown. Mycorrhiza. 2015;25:499-515. DOI:10.1007/s00572-015-0627-6 (IF 2.985).

Dias T, Martins-Loução MA, Sheppard L, **Cruz C**. Plant tolerance of ammonium varies between co-existing Mediterranean species. Plant and Soil. 2015;395:243-252. DOI:10.1007/s11104-015-2552-z (IF 2.952).

Hessini K, Ferchichi S, Ben Youssef S, Werner KH, **Cruz C**, Gandour M. How Does Salinity Duration Affect Growth and Productivity of Cultivated Barley? Agronomy Journal. 2015;107:174-180. DOI:10.2134/agronj14.0281. (IF 1.542).

Shibata H, Branquinho C, McDowell WH, Mitchell MJ, Monteith DT, Tang J, Arvola L, **Cruz C**, Cusack D, Halada L, Kopacek J, Máguas C, Sajidu S, Schubert H, Tokuchi N, Záhora J. Consequence of altered nitrogen cycles in the coupled human and ecological system under changing climate: the need for long-term and site-based research. Ambio. 2015;44:178-193. DOI:10.1007/s13280-014-0545-4 (IF 2.295).

Shvaleva A, Siljanen HM, Correia A, Costa E Silva F, Lamprecht R, Lobo-do-Vale R, Bicho MG, Fangueiro D, Anderson M, Pereira JS, Chaves M, **Cruz C**, Martikainen PJ. Environmental and microbial factors influencing methane and nitrous oxide fluxes in Mediterranean cork oak woodlands: trees make a difference. Frontiers in Microbiology. 2015;6:1104. DOI:10.3389/fmicb.2015.01104 (IF 3.941).

Corrêa A, **Cruz C**, Pérez-Tienda J, Ferrol N. Shedding light onto nutrient responses of arbuscular mycorrhizal plants: nutrient interactions may lead to unpredicted outcomes of the symbiosis. Plant Science. 2014;221-222:29-41. DOI:10.1016/j.plantsci.2014.01.009 (IF 2.922).

Dias T, Clemente A, Martins-Loução MA, Sheppard L, Bobbink R, **Cruz C**. Ammonium as a driving force of plant diversity and ecosystem functioning: observations based on 5 years' manipulation of N dose and form in a Mediterranean ecosystem. PLoS One. 2014;9:e92517. DOI:10.1371/journal.pone.0092517 (IF 3.73).

Fonseca MB, Carolino MMSSL, Dias T, **Cruz C,** França MGC. Early growth of Brazilian tree *Dimorphandra wilsonii* is also threatened by African grass *Urochloa decumbens*. Journal of Plant Interactions. 2014;9:92-99. DOI:10.1080/17429145.2013.770085 (IF 0.641).

Gouveia W, Jorge T, Martins S, Meireles M, Carolino M, **Cruz C**, Almeida TV, Araújo MEM. Toxicity of ionic liquids prepared from biomaterials. Chemosphere. 2014;104:51–56. DOI:10.1016/j.chemosphere.2013.10.055. (IF 3.137).

Munzi S, **Cruz C**, Branquinho C, Pinho P, Leith ID, Sheppard LJ. Can ammonia tolerance amongst lichen functional groups be explained by physiological responses? Environmental Pollution. 2014;187:206–209. DOI:10.1016/j.envpol.2014.01.009 (IF 3.73).

Pinho P, Llop E, Ribeiro MC, **Cruz C**, Soares A, Pereira MJ, Branquinho C. Tools for determining critical levels of atmospheric ammonia under the influence of multiple disturbances. Environmental Pollution. 2014;188:88-93. DOI:10.1016/j.envpol.2014.01.024 (IF 3.73).

Shvaleva A, Costa e Silva F, Costa JM, Anderson M, Lobo-do-Vale R, Fangueiro D, Bicho C, Pereira JS, Chaves MM, Skiba U, **Cruz C**. Comparison of methane, nitrous oxide fluxes and CO_2 respiration rates from a Mediterranean cork oak ecosystem and improved pasture. Plant and Soil. 2014;374:883-898. DOI:10.1007/s11104-013-1923-6. (IF 2.638).

Silva MCS, Paula TA, Moreira BC, Carolino M, **Cruz C**, Bazzolli DMS, Silva CC, Kasuya MCM. Nitrogen-fixing bacteria in Eucalyptus globulus plantations. PLoSOne. 2014;9:e111313. DOI:10.1371/journal.pone.0111313 (IF 3.53).

Baptista SL, Vaz Pinto P, Freitas MC, **Cruz C**, Palmeirim JM. Geophagy by African ungulates: the case of the critically endangered giant sable antelope of Angola (*Hippotragus niger variani*). African Journal of Ecology. 2013;51:139–146. DOI:10.1111/aje.12020. (IF 0.631).

Dias T, Oakley S, Alarcón-Gutiérrez E, Ziarelli F, Trindade H, Martins-Loução MA, Sheppard L, Ostle N, **Cruz C**. N-driven changes in a plant community affect leaf-litter traits and may delay organic matter decomposition in a Mediterranean maquis. Soil Biology and Biochemistry. 2013;58:163–171. DOI:10.1016/j.soilbio.2012.10.027 (IF 3.504).

Ekblad A, Wallander H, Godbold DL, Johnson D, Baldrian P, Björk RG, **Cruz C**, Epron D, Kieliszewska-Rokicka B, Kjöller R, Kraigher H, Matzner E, Neumann J, Plassard C. The production and turnover of extramatrical mycelium of ectomycorrhizal fungi in forest soils: role in carbon cycling. Plant and Soil. 2013;366:1-27. DOI:10.1007/s11104-013-1630-3 (IF 2.638).

Hessini K, Ben Hamed K, Gandour M, Mejry M, Abdelly C, **Cruz C**. Ammonium nutrition in the halophyte *Spartina alterniflora* under salt stress: evidence for a priming effect of ammonium? Plant and Soil. 2013;370:163-173. DOI:10.1007/s11104-013-1616-1. (IF 2.638).

Munzi S, Branquinho C, **Cruz C**, Loppi S. Nitrogen tolerance in the lichen Xanthoria parietina: the sensitive side of a resistant species. Functional Plant Biology. 2013;40:237-243. DOI:10.1071/FP12127 (IF 2.929).

Pintó-Marijuan M, Bernardes da Silva A, Flexas J, Dias T, Zarrouk O, Martins-Loução MA, Chaves MM, **Cruz C.** Photosynthesis of Quercus suber is affected by atmospheric NH3 generated by multifunctional agrosystems. Tree Physiology. 2013;33:1328-1337. DOI:10.1093/treephys/tpt077 (IF 2.853).

Corrêa A, Gurevitch J, Martins-Loução MA, **Cruz C**. C allocation to the fungus is not a cost to the plant in ectomycorrhizae. OIKOS. 2012;121:449–463. DOI:10.1111/j.1600-0706.2011.19406.x (IF 3.393).

Dias T, Martins-Loução MA, Sheppard L, **Cruz C**. The strength of the biotic compartment in retaining nitrogen additions prevents nitrogen losses from a Mediterranean maquis. Biogeosciences. 2012;9:193-201. DOI:10.5194/bg-9-193-2012 (IF 3.587).

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Dias T, Neto D, Martins-Loução MA, Sheppard L, **Cruz C**. Patterns of nitrate reductase activity vary according to the plant functional group in a Mediterranean maquis. Plant and Soil. 2011;347:363-376. DOI:10.1007/s11104-011-0856-1 (IF 2.519).

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Shvaleva A, Lobo-do-Vale R, **Cruz C**, Castaldi S, Rosa AP, Chaves MM, Pereira JS. Soil-atmosphere greenhouse gases (CO_2, CH_4 and N_2O) exchange in evergreen oak woodland in southern Portugal. Plant Soil and Environment. 2011;57:471-477. (IF 1.078).

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4.3 Books

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4.4 Book chapters

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Martins-Loução MA, **Cruz C**. The role of N source on carbon balance. In: Srivastava HS, Singh RP, editors. Nitrogen Nutrition and Plant Growth. New Delhi: Oxford and IBH Publishing; 1999:231-282.

4.5 Reports

Simões LF, **Cruz C**, Ribeiro RA, Correia L, Seidl T, Ampatzis C, Izzo D. Path Planning Strategies Inspired by Swarm Behaviour of Plant Root Apexes. Ariadna ID: 09/6401. Advanced Concepts Team, European Space Agency; 2011.

5. Other work

5.1 Experience as a consultant

2016 & 2017: Consultant to the European Commission as an external expert evaluator of the International Space Station project "EDEN ISS - Ground Demonstration of Plant Cultivation Technologies for Safe Food Production in Space".

2011, 2012 & 2013: Consultant to the European Commission as an external expert evaluator of progress reports of projects selected for the Seventh Framework Programme (FP7), call KBBE 2007 2A.

2008: Consultant to the European Commission as an external expert evaluator of proposals presented in response to call KBBE 2007 2A of the Seventh Framework Programme (FP7).

5.2 Experience as a scientific referee and examiner

2011: Examiner of the PhD thesis "Modeling lichen communities: ecological key factors in a changing environment" presented by Pedro Pinho to the University of Lisbon, Portugal.

2010: Examiner of the PhD thesis "Efeitos da toxicidade por metais pesados em *Rhizobium leguminosarum* bv. *trifolii*" presented by Sofia Isabel de Almeida Pereira to the University of Aveiro, Portugal.

2009: Examiner of the PhD thesis "Rizobactérias promotoras de crescimento vegetal isoladas de cana-de-açúcar sob fertilização orgânica e/ou convencional" presented by Zilda Machado to the University of São Paulo, Brazil.

2009: Examiner of the PhD thesis "Potential value of arbuscular mycorrhiza in the agricultural system of the Alentejo region - Portugal" presented by Isabel Maria de Oliveira Brito to the University of Évora, Portugal.

2009: Evaluator of the academic curriculum of M. Cramer for Cape Town University, South Africa.

2009: Evaluator of the academic curriculum of A. Feest for the University of Leeds, U.K.

2008: Examiner of the PhD thesis "Photosynthesis and photorespiration in three C4 grasses of different metabolic sub-types, under water stress" presented by Ana Elizabete do Carmo Silva to the University of Lisbon, Portugal.

2008: Examiner of the PhD thesis "Invasion of Portuguese coastal dunes by *Acacia longifolia*" presented by Elizabete Marchante to the University of Coimbra, Portugal.

2008: Examiner of the Master's Thesis "Comparação entre comunidades de fungos micorrízicos arbusculares de sistemas agrícolas e de sistemas naturais, no Norte de Portugal" presented by João Apolinário Crisóstomo to the University of Coimbra, Portugal.

2007: Examiner of the PhD thesis "Factors influencing plant response during mycorrhizal establishment and formation: the cost-benefits in a symbiotic continuum" presented by Ana Margarida Correa to the University of Lisbon, Portugal.

2007: Examiner of the PhD thesis "Actividade microbiana nos processos de decomposição em sedimentos de sapais do estuário do Tejo" presented by Ana Luísa Alves Figueira da Costa to the University of Lisbon, Portugal.

2006: Examiner of the PhD thesis "Mecanismos de tolerancia al amonio en plantas de interés agronómico" presented by Maria Dolores Domínguez-Valdivia to the Public University of Navarra, Spain.

2006: Examiner of the PhD thesis "The role of mycorrhizae in Mediterranean ecossystem revegetation" presented by Patrícia Maria Ferreira Correia to the University of Lisbon, Portugal.

5.3 Peer revision

Peer reviewer of articles in many scientific journals, including the following:

- BMC Plant Biology
- Environmental Pollution
- Euphytica
- European Journal of Soil Science
- Journal of Experimental Botany
- Journal of Plant Nutrition
- Journal of Plant Physiology
- Journal of Plant Studies
- Journal of Soils and Sediments
- New Phytologist
- Plant Cell and Environment
- Planta
- Soil Biology and Biochemistry

Lisbon, January 2020