

## Curriculum vitae

MARIA MANUELA COELHO CABRAL FERREIRA CHAVES

PERSONNEL DATA

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### Birth Place and Date

Ponta Delgada, Açores. Portugal.

10 September 1946

DEGREES AND ACADEMIC POSITIONS

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### Degrees

- Agregação (syn. Habilitation) by the Technical University of Lisbon (UTL), 1992.
- Doctor in Agronomy/Plant Physiology, UTL. 1986. 'Fotossíntese e Repartição dos Produtos de Assimilação em *Vitis vinifera* L'. 220 pp.
- Graduation in Agronomy by the Instituto Superior de Agronomia (ISA), UTL, 1970 (17/20). Prizes in ISA: D. Dinis (1965), Massey Fergusson (1967), Dr. Brito Camacho(1968).

### Positions

#### *Present*

2008 to date - Professor 'Emeritus' from the Technical University of Lisbon (UTL).

2001 to date - Leader of the Laboratório de Ecofisiologia Molecular de Plantas (Plant Molecular Ecophysiology Lab.) Instituto de Tecnologia e Química Biológica (ITQB), Oeiras.

#### *Previous - Academic*

1996/2008 - Full Professor (Prof. Catedrática), Dep. Botânica e Engenharia Biológica, Instituto Superior de Agronomia (ISA), Technical University of Lisbon (UTL).

October 2006/ August 2008 - Head of Department 'Botânica e Engenharia Biológica', ISA. UTL.

1992/Jan 2004 - Scientific coordinator of the "Centro de Botânica Aplicada à Agricultura, UTL"

Mai 1993/1996- Professora catedrática convidada. Dep. Botânica e Engenharia Biológica (DBEB), ISA. UTL.

Oct 1989 /1996- Investigadora Principal. ISA. UTL.

Dec.1979 /Oct. 1989 - Investigadora Auxiliar, ISA. UTL.

April 1972 - Dec. 1979 - Investigadora. ISA. UTL.

May 1971 - Oct 1971 - Wissenschaftliche Assistentin, "Zentral Laboratorium". Univ. Frankfurt.

Dec. 1970/May 1971 - Wissenschaftliche Assistentin , "Botanisches Institut". Univ. Erlangen-Nürnberg.

Oct. 1969 / April 1970 - Research Assistant. "Department of Biological Chemistry", Univ. de Manchester.

*Previous - University Management*

1996-2000 - Vice-President of the 'Conselho Científico' ISA, UTL

1994-1995; 2004-2006- Vice-Head of Department (DBEB).

1990-2003- Member of Executive Committee of the do Master Course in 'Produção Vegetal' ISA, UTL.

1991- Member of 'Comissão Proponente do Instituto de Investigação de Sistemas Agrários (IISA), Programa Ciência.

1989-1990 - Member of 'Conselho Pedagógico' do ISA, UTL.

1990-1995- Member of 'Senado Universitário', UTL

1982-1985 - Member of Executive Committee of DBEB.

1977-1978, 1985-1987 - Member of the 'Conselho Directivo' ISA, UTL.

**Prizes**

- 1<sup>st</sup> Prize UTL/Santander Totta, area of Agronomy 2007 for excellence in science- Jan 2008.
- Annals of Botany (UK) award, 2008.

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SCIENTIFIC ACTIVITY

**Coordination of scientific projects**

***Portuguese Funding Agencies:***

As PI of the Project:

- 2005-2008 POCI/AGR/59079/2004 funded by FCT. 'Understanding defence responses of grapevine to drought stress- metabolic regulation at the leaf and berry levels'.
- 2005-2007 REEQ/834/AGR/2005 Estudo da resposta das plantas ao stress utilizando Termografia e Fluorescência de Imagem.
- 2005-2008 POCI/AGR/61980/2004 funded by FCT. 'Limitações na assimilação do carbono devidas à idade das árvores em povoamentos de *Eucalyptus globulus* (Labill.) Partner in ITQB'. (General Coordination: Sofia Cerasoli, ISA).
- 2002-2004 POCTI/BIA/227/94/2001 funded by FCT. 'Physiological response of plants under environmental stress conditions'.
- 1996-1999 Proj. PRAXIS/FLOR/2110/95 funded by FCT 'Caracterização fisiológica e genética de um Banco Clonal de *Eucalyptus globulus* Labill em Portugal'.

- 1996-1998 Proj. PAMAF 2064 "Seleção de Clones de *Olea europaea* L. utilizados na Produção do 'Azeite de Moura' (denominação de origem) para Renovação dos Olivais de Serpa e Moura. Partner no ISA. (General Coordination: Pedro Fevereiro, IBET).
- 1995/1999 Proj. PRAXIS 2/2.1/BIA/227/94 funded by FCT 'Respostas fisiológicas de plantas em condições adversas'.
- 1993-1995 Proj. STRIDE/empresa STRD/AGR/0023 funded by JNICT "Estudos de Tolerância ao Frio e à Secura em Híbridos de Eucalipto", collaboration of Soporcel.
- 1990-1993 Proj. 549/90/AGR funded by JNICT "Fotossíntese e Produtividade Vegetal em Condições de Temperatura Elevada".

As partner and Leader of LEM group:

PTDC/AGR-ALI/100636/2008 GrapeBerryFactory - Sugars, acids, phenolics and water on grape berry development and ripening. (PI. H Gerós; M Chaves coordination of the LEM/ITQB team).

- 2009-2012 PTDC/AGR-AAM/099154/2008. AQUAVITIS - Understanding water transport in *Vitis vinifera*: biochemical characterization of aquaporins upon their heterologous expression in yeast (PI - Maria Conceição Loureiro Dias; M Chaves coordination of the LEM/ITQB team).

- 2009-2012 PTDC/AGR-CFL/099614/2008 Phenotypic plasticity of maritime pine to climate change. (PI- Isabel Correia; M Chaves coordination of the LEM/ITQB team).

- 2009-2012 PTDC/BIA-BEC/099323/2008 Spheres of Ecosystem Response to Nitrogen (SERN): A case study in a Mediterranean-type ecosystem in southern Portugal. (PI - Cristina Cruz; M Chaves coordination of the LEM/ITQB team).

2007-2010 PTDC/AGR-AAM/64078/2006 'Molecular Evaluation and Characterization of Tolerance Mechanisms to Adverse Environmental Conditions in *Coffea* sp. - Central Role of the Oxidative Stress Control at Leaf Level' (Project Coordination: JC Ramalho; M Chaves coordination of the LEM/ITQB team)

### **Foreign Funds**

#### *Volkswagen Foundation*

- 1990-1992 - "Characterization and metabolic mechanisms of sink control in photosynthesis". Coordination of University of Bayreuth (Prof. Mark Stitt).

#### *EU Projects (leader of the Portuguese team):*

- INNOVINE (EU KBBE.2012- 6. 311775) «Combining innovation in vineyard management and genetic diversity for a sustainable European viticulture». 2013-2016. Coord AF Adam-Blondon. INRA, Versailles (France).
- 3TO4 (EU KBBE.2011.3.1-01) «CONVERTING C3 TO C4 PHOTOSYNTHESIS FOR SUSTAINABLE AGRICULTURE». 2012-2016. COORD R C LEEGOOD (UK).
- SWUP-MED (FP7-2007-KBBE-212337) 'Sustainable water use securing food production in dry areas of the Mediterranean region' 2008-2012.
- WATERWEB (FP6-2002-INCO-WBC-509163), 'Water resource strategies and drought alleviation in Western Balkan Agriculture' 2004-2007.

- STRESSIMAGING (IHP-RTN-00-2001) 'Diagnosis and analysis of plant stress using thermal and other imaging techniques' 2002-2006 ;
- NETCARB (HPRN-CT-1999-00059) "Network for Ecophysiology in Closing terrestrial Carbon Budget" 2001-2004;
- CARBONSINK-LBA (EVK2 - CT- 1999-000023) "The future of the tropical forest carbon sink" 2001-2003.;
- IRRISPLIT (ICA-1999-10026) "Partial Root Drying: a sustainable irrigation system for efficient water use without reducing fruit yield" 2001-2003;
- AIR Nr. CT93-1031, "Improvement of forage crops for semi-arid areas" 1993/1997;
- STD Nr. TS3-CT93-0202 "Natural Resource Development and Utilisation in the Sahel" 1993/1997;
- Project ST2J-0339-C (EDB) "The Effects of Water Stress on Photosynthesis". 1987-1990.

### **Networks and COST Actions:**

#### National representative in

- 2006- 2010 - COST FA0605: Signalling control of stress tolerance and production of stress protective compounds in plants.
- 2004-2009 - COST 858: 'Viticulture. Biotic and abiotic stress -Grapevine defence mechanism and grape development.'
- 1996-2000 - COST E-6 'Eurosilva'
- 1992- 1995 Network "STRESSNET: A Multidisciplinary Research Network to Study and Improve the Abiotic Tolerance of European Agricultural Crops".
- 1991 -1996 - COST 614 "Impact of Elevated CO<sub>2</sub> Levels and Air Pollutants on Tree Physiology" (ICAT).

### **Bilateral Agreements:**

- 2011-2012 «Use of infrared thermography for detection of potato drought stress and as tool for irrigation scheduling» with Radmila Stikic, Faculty of Agriculture. University of Belgrade. Servia
- 2010-2011 «A comparative study of biochemical and molecular mechanisms involved in the response of some barley cultivars and varieties under water deficit conditions» with Ali Ferchichi, Institut des Régions Arides, Medenine. Tunisia
- 2008/2009 - GRICES/BC- « Screening for stress responsive metabolites», with Jane Thomas-Oates, University of York.
- 2006/2007 - «Effet d'un déficit hydrique, crée par dessèchement partiel des racines, sur l'olivier et la vigne», with Rachida Wakrim, Univ. Marrakech. Maroc.
- 2000 - ICCTI/BC agreement 'Impact of climate change in forest functioning'
- 1995/1996 JNICT/Embaixada de França, with the Laboratoire du Métabolisme et de la Nutrition des Plantes, INRA, Versailles, J.F. Morot-Gaudry. France.
- 1995/1996 JNICT/DAAD (Programme INIDA) F. Schöffl, Lehrstuhl für Allgemeine Genetik. Fakultät Biologie. Univ. Tübingen. Germany.
- 1994/1995 - JNICT/BC Proc. 81. "Carbon and nitrogen metabolism in plants growing under elevated CO<sub>2</sub>", Richard Leegood, Univ. de Sheffield. UK.

- 1993/1994 - Portugal/Spain Action N° E-40 "Fotossíntese e Produtividade de Espécies Nativas da Zona Mediterrânica em Condições de Stress Ambiental", with H. Medrano, Univ. das Illes Balears, Palma de Maiorca. Spain.
- 1993/1994 - JNICT/BC n° 423/RU. "Regulation of growth under drought conditions-water balance and carbon metabolism in shoots and roots", with W. Davies, Univ. Lancaster. UK.
- 1991/1992 - INIC/British Council with W. Davies, Univ. de Lancaster (UK), on "Fisiologia das Plantas em Condições Adversas". UK.
- 1988/1989; 1989/1990 - Treaty of Windsor "Influência das Disponibilidades Hídricas na Fotossíntese de Plantas Agrícolas", with R. Leegood do Robin-Hill Institute, Sheffield. UK.
- 1988/1989 - Portugal/France "Influence des ressources en eau sur les échanges gazeux et le comportement hydrique de la vigne", with N. Katerji, Station de Bioclimatologie, INRA, Paris/Grignon e F. Daudet do Laboratoire de Bioclimatologie INRA, Clermont-Ferrand. France.

#### **Member of the Editorial boards**

- *Functional Plant Biology*, Australia (since 2002). **Associate Editor** (since 2008)
- *PeerJ* (since 2012)
- *Journal of Experimental Botany*, UK (1998-2012).
- *Journal of Plant Physiology*, Germany (2007-2009)

#### **Seminars given in Universities in:**

Netherlands, France, UK, Germany, Spain, Denmark, Brazil and China.

#### **Participation in Academic Jury's**

##### *Doctoral thesis in*

France (Bordeaux 1993, Nancy 1996, Orsay 1995, 1997, Paris XI 2005), UK (Lancaster 2003, 2006), Spain (Univ Illes Balears, Maiorca 2002, 2004, 2011; Univ. Barcelona 2006, 2007), Denmark (Life Sciences Faculty, Copenhagen and Aarhus 2011)

Participation in more than forty Jury's for the degrees of Master, Doctor and Agregação in Portuguese Universities as well as in the Research Career.

##### *Habilitation jury :*

Dr. Jaleh Ghashaie. Univ Orsay, Paris (2004).

#### **Member of evaluation panels**

##### *International*

Evaluation of Larry Williams merit dossier (Professor, Step VI), in the Department of Viticulture and Enology at the University of California, Davis. September 2011.

Member of the jury for recruitment of a Directeur de Recherche à l'INRA Montpellier. Paris, Dec 2010.

Panel for the evaluation of the research of the Environmental Horticulture Program (EHP) of IRTA, Barcelona. Nov 2010.

Panel for the evaluation of the research activities of 'The Laboratory of Plant Molecular Physiology' (Centre of Biotechnology of Borj-Cédria "CBBC" in Tunis – Tunisia,. Nov 2010.

Panel for the evaluation of CSIC Institutes (Sevilla,Spain). Nov 2008- Jan 2009

Member of the visiting committee to evaluate the research unit « Ecophysiologie et Génomique Fonctionnelle de la Vigne », Institut des Sciences de la Vigne et du Vin, Bordeaux, October 2009.

Member of the scientific Advisory Board of the Plant- KBBE programme - 4<sup>th</sup> call for proposals. Marseille, September 2009).

Panel for the evaluation of the 'Département Agronomie et Environnement', INRA, France. Avignon. January 2008.

Project proposals of the EU (Environment area; Marie Curie TRN and Individual grants 2005, 2007).

Vice-chair of Marie Curie individual fellowships in the Environment panel (2007)

Project proposals for NERC, in UK; USDA and BARD in USA; ANR, National Research Agency, France and for the Spanish, Israeli and Chilean government.

Panel for the definition of EU funding on the area of Natural Resource Development and Utilization". Wageningen (1992).

#### *Portugal*

Coordinator of the panel for the research fellowships under the Programme 'Ciência Global', in the area of Agriculture and Plant Biology 2010 (FCT).

Coordinator of the panel for FCT research fellowships in the area of Agronomy (2010 and 2011).

Member of the panel for the evaluation of FCT Research Fellowships in the area of Biology (1996-2009) and Agronomy (2008).

**Sabbatical Leave** September 1996/ February 1997 with Prof. Detlef Schulze. Lehrstuhl für Pflanzen Ökologie. University of Bayreuth. Germany.

#### **Scientific Societies and Committees**

- Member of the *Academia de Ciências de Lisboa* (corresponding member since 1994, full member since 2001).
- President of the *Sociedade Portuguesa de Fisiologia Vegetal* (1998- 2005).
- 1<sup>st</sup> President of the National Committee of the International Geosphere-Biosphere Programme (*IGBP*), 1999 -2002.
- Member of the *Inter-Academy Council Study* on 'Science and Technology for Improving Agriculture Productivity and Food Security in Africa' (2002-2004).
- Member of the *Advisory Committee for Global Change* on the 6<sup>th</sup> Framework Programme of the EU (from 2002-2006).
- Member of the *Fellowships Committee* of the Federation European Societies of Biochemistry (*FEBS*) 2006-2009.
- Member of the Evaluation Panel of the *Biology Degrees in Portuguese Universities*, 2000-2001.
- Member of the Conselho Técnico Consultivo da ADVID, Associação para o Desenvolvimento da Viticultura Duriense (since 2007)

- EPSO representative for the consortia of ITQB; IBET; IGC; ISA and FCUL (since 2009)

### Organization of Conferences (National and International)

- ISHS Lisbon August 2010 (Member of the Scientific Committee).
- XI Congreso Hispano-Luso de Fisiología Vegetal, Zaragoza September 2009 (Member of Organizing Committee).
- INTERDROUGHT III October 2009. Shanghai (Member of Programme Committee and of the Scientific Committee)
- *XVI National Congress of Biochemistry*. Ponta Delgada October 2008. (Member of Scientific Committee)
- *COST Action 858 Meeting on 'Viticulture. Biotic and abiotic stress -Grapevine defence mechanism and grape development.'* Porto. May 2008 (Co-organizer).
- *X Congresso Luso-Espanhol de Fisiologia Vegetal 2007* Alcalá de Henares (Member of Scientific Committee).
- *XV National Congress of Biochemistry*. Aveiro. December 2006 (Member of Scientific Committee)
- *XV Congress of the Federation of the European Societies of Plant Biology*. Lyon. France. Julho 2006 (Member of International Advisory Committee)
- INTERDROUGHT II 2005. Rome (Member of Scientific Committee)
- *IX Congresso Luso-Espanhol de Fisiologia Vegetal 2005* Évora. (President of the Congress).
- *XIV Congresso Nacional de Bioquímica*. Vilamoura. 2004. (Member of Scientific Committee)
- Congress on "*Optimisation of Water use by Plants in the Mediterranean*" 2003, Cala Bona, Maiorca, Spain. (Member of Organizing Committee)
- *XIII Congresso Nacional de Bioquímica*. Lisboa. 2002. (President of the Organizing Committee).
- *Seminário ISA 2000. Ambiente, Território e Agricultura'*. ISA/UTL, Tapada da Ajuda. Lisboa. (President of the Organizing Committee).
- Workshop "*Field Instrumentation for Environmental Physiology*" 1989. Faro (Co-organizer)

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### TEACHING (UNDERGRADUATE AND POST-GRADUATE)

Plant Physiology; Plant Ecophysiology; Crop Productivity; Plant Responses to Environmental Global Changes.

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### RESEARCH INTERESTS

Plant ecophysiology: Photosynthesis, partitioning of assimilates and growth.

Stress physiology and plant response to global environmental change.

Crop Physiology: effects of the environment and of cultural practices on plant growth and production.

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RESEARCH SUPERVISION

MASTER THESIS

*Supervisor*

- José Cochicho Ramalho "Respostas Morfofisiológicas à Deficiência Hídrica em duas Linhas de *Lupinus albus*". *Thesis discussed in 1990.*
- Isabel Maria Vitória Duarte "Resistência à Secura em Grão de Bico (*Cicer arietinum* L.)". *Thesis discussed in 1994.*
- Ana Paula G Correia Vaz Portugal «Efeito do CO<sub>2</sub> elevado no crescimento e metabolismo fotossintético do carbono em plantas de tabaco (*Nicotiana tabacum* L.) selvagens e transgênicas com decrescentes níveis de RUBISCO». *Thesis discussed in 1995.*
- João Paulo Maroco «As gramíneas sahelians *Schoenefeldia gracilis* e *Dactyloctenium aegyptium* sob stress hídrico». *Thesis discussed in 1995.*
- Tiago Faria 'Variação sazonal na assimilação do carbono e na fotoproteção em folhas de sobreiro (*Quercus suber* L.)'. *Thesis discussed in 1996.*
- Bertina Alexandre 'Estudo da utilização de reguladores de crescimento na produção de plantas de tomateiro em viveiro' *Thesis discussed in 1998.*
- Ana Rodrigues 'Adaptação do *Lupinus albus* L. ao déficit hídrico: caracterização fisiológica e bioquímica.' *Thesis discussed in Febr. 2006.*
- João Azevedo 'Optimização da gestão de rega localizada em pereira 'Rocha' (*Pyrus communis* L.) com recurso a indicadores de teor de água no solo e a parâmetros fisiológicos'. *Thesis discussed in Febr. 2008.*
- Raissa Santos (Bologna system) «Impact of water deficit on grape seed proanthocyanidins and anthocyanins biosynthesis: Biochemical and Molecular regulation». *Thesis discussed in December. 2009.*

*Co-supervisor*

- João Paulo Rebordão "Aclimatização da videira (*Vitis vinifera* L.) multiplicada *in vitro*: efeito da variação da disponibilidade luminosa". Co-supervisor with Sara Amâncio. *Thesis discussed in 1995.*

DOCTORAL THESIS

*Supervisor*

- Maria Leonor Osório 'Fotossíntese e aclimação a temperaturas elevadas em *Lupinus albus* L. e *Vitis vinifera* L.' (Doctor in 1994. ISA, UTL).
- Isabel Carvalho 'Influência do Stress Hídrico no Metabolismo do Carbono e na Formação da Semente em Espécies de *Lupinus* (*L. albus* e *L. mutabilis*)'. (Doctor in 1999. ISA, UTL).
- Tiago Faria, 'Efeitos das mudanças climáticas globais no funcionamento das árvores- estudos bioquímicos e fisiológicos'. (Doctor in 2001. ISA, UTL).



- Isabel Maria Victoria Duarte Maças 'Seleção de linhas de grão de bico (*Cicer arietinum* L.) adaptadas ao ambiente Mediterrânico - critérios morfológicos e fisiológicos'. (Doctor in 2004. Univ Évora)
- Claudia de Souza 'Estudo da fisiologia e da qualidade da produção na vinha, em resposta à aplicação de um sistema de rega parcial'. (Doctor in Jan 2005. ISA, UTL)
- André Pestana "Effects of light acclimation and water stress on Amazon tree seedlings of different ecological groups" (Doctor in Jan 2010. ISA, UTL).
- Rita Francisco "Biochemistry of Grape Berries: Post-genomics approaches to uncover the effects of water deficits on ripening ". Doctor in June 2011. ITQB, UNL).
- Raquel Vale 'Assimilação do carbono pelas árvores de uma floresta tropical húmida da Amazónia: sazonalidade, variação inter-anual e o impacto de secura induzida'. (Doctor in February 2012. Univ Évora)
- Miguel Leão (2006-2012) 'Optimização do potencial produtivo da pereira "ROCHA" com base no estudo de indicadores fisiológicos'.
- Ana Rita Leandro (2007-)

#### Co-Supervisor

- Paula Santos (Doctor in 2011) Respostas ao Nível Molecular na Tolerância a Baixas Temperaturas Positivas em *Coffea* sp. (ISA, UTL)
- Maria Teresa Portes 'Utilização fotossintética da luz em espécies arbóreas da sucessão florestal sob a influência de diferentes condições ambientais', da Universidade Estadual de S. Paulo. (2008). One year sanduíche stay in LEM.
- Tanise Sausen Instituto de Biociências - UFRGS. Porto Alegre. (2008). One year sanduíche stay in LEM.
- Margarida Vaz 'Variações sazonais no balanço de carbono em *Quercus suber* e *Quercus ilex*'. (Doctor in 2006. Univ Évora).
- Alena Neto 'Atributos fisiológicos e relações hídricas em genótipos de mamoeiro (*Carica papaya* L.) na fase juvenil'. (Doctor in 2005. Univ Estadual do Norte Fluminense. Rio de Janeiro. Brasil). One year sanduíche stay in LEM.
- Isabel Andrade 'Efeito da intensidade da desfolha da videira (*Vitis vinifera* L.) na fotossíntese, na produção e na qualidade'. (Doctor in 2003. ISA, UTL)
- Sofia Cerasoli 'Partição e mobilização do Carbono e do Azoto no sobreiro'. (Doctor in 2002. ISA, UTL).

#### Member of Accompanying Pannel

- Anne Quereix 'Elaboration et validation de modèles de fonctionnement des stomates de la vigne'. (Doctor in 2001. Univ Bordeaux).

#### Postdocs Supervision

- Rita Francisco 2011 - present (FCT grant)
- Marta Pintó Marijuan 2009 - present (FCT grant + Spanish grant)
- Olfa Zarouk 2007- present ( FCT grant)
- Ana Regalado 2007- 2011 ( FCT grant)
- Tiago Santos 2007- 2009 (FCT grant)
- Marta Lopes 2007- 2008 (FCT grant)

- M<sup>a</sup> Fernanda Ortuno 2005-2007 (CSIC grant)
- Miguel Costa 2004-2007 ; 2007- 2010; 2010 – present (FCT grant)
- Alla Shvaleva 2003- present (FCT grant)
- Cathy Besson 2002- 2009 (RTN EU/FCT grant)
- Olga Grant 2003-2005 (RTN EU grant)
- Cecile Barbaroux 2003-2004 (RTN EU grant)
- João Maroco 2000-2003 (FCT grant)
- Maria Leonor Osório 1994-1996 (FCT grant)

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## CONFERENCES (INVITED)

### In Congresses

- 2012 Key note speaker at the 6<sup>th</sup> International Crop Science Congress. « Crop resistance to abiotic stresses – mechanisms, traits and mitigation strategies» Bento Gonçalves. Brasil.
- 2011 Invited speaker at the EUROCASE (European Council of Academies of Applied Sciences, Technologies and Engineering) Annual Conference, giving the Lecture « Crops in a changing environment – exploring new traits and management tools». Madrid, Spain.
- 2011 Plenary lecture at the XIII Congresso Brasileiro de Fisiologia Vegetal, «Crop production in a changing environment - challenges and mitigation strategies». Búzios, Brasil.
- 2010 Invited speaker at the International Horticulture Congress (IHC) giving the Lecture ‘Deficit irrigation in Mediterranean Vineyard: a tool to control grapevine and berry development’. Lisboa, Portugal.
- 2009 Invited speaker at the Interdrought III conference giving the Lecture ‘Photosynthesis and C Metabolism under Drought – early warnings and ultimate constraints’. Shanghai, China.
- 2008 Annals of Botany Plenary Lecture ‘Grapevine and berry development under deficit irrigation – physiological and molecular regulations’ in COMBIO2008, Canberra, Australia.
- 2008 Invited speaker at the satellite meeting of the COMBIO2008, Plant Energy and Water Productivity, Canberra, Australia, giving the Lecture ‘Effects of drought stress on photosynthesis and sugar metabolism’.
- 2008 Key note speaker at the «VI International Symposium of the ISHS on Fruit Crops Mineral Nutrition», in Faro, Portugal, giving the Lecture «Deficit irrigation practices - saving water without reducing fruit yield and quality?»
- 2007 Key note speaker at the XIV International Congress on Photosynthesis. Glasgow, UK. ‘Photosynthesis under drought and salt stress: differences and similarities’.
- 2006 Invited speaker ‘A assimilação do carbono numa floresta da Amazônia – efeitos da simulação de uma seca prolongada’. 1<sup>a</sup> Conferência Lusófona do Sistema Terra. IGBP. Lisboa.

- 2006 Invited speaker 'Understanding plant response to the environment in the Mediterranean: clues from seasonal and temporal variability'. *XV Congress of the Federation of the European Societies of Plant Biology*. Lyon. France.
- 2006 'Eficiência do uso da água e rega deficitária'. Plenary Lecture on the *XIX Congresso Brasileiro de Fruticultura*. Cabo Frio. Brasil.
- 2005 Invited speaker at the WUEMED workshop *Improving Water-Use Efficiency in Mediterranean agriculture: what limits the adoption of new technologies?*. 'Deficit irrigation in grapevine improves water-use efficiency while controlling vigour and production quality'. Rome. Italy.
- 2004 'Plant responses under drought- from physiology to crop management'. Workshop "*Improvement of tolerance to environmental stress and quality in cereals*". Plant Breeding and Acclimatization Institute, Radzikow n/Warsaw, Poland.
- 2004. 'Water use efficiency in grapevines'. Workshop '*Water transport and Aquaporins in Grapevine*' 21-22 October. Maiorca, Spain,
- 2003 'Understanding plants under drought - constraints and adaptations'. Workshop on Plant Stress Biology. Braga. Portugal.
- 2003 The impact of climate change on carbon uptake by Amazonia forests - mimicking drought with partial rain exclusion. *VIII Congreso Hispano-Luso de Fisiologia Vegetal*. Palma de Maiorca.
- 2003 'Carbon Assimilation and Water Deficits: Regulations and Manipulation to Optimise Plant Production'. International Conference on '*Water-Saving Agriculture and Sustainable use of Water and Land Resources*'. Yangling. China.
- 2001 'Water stress in the regulation of photosynthesis in the field'. *Society for Experimental Biology Annual General Meeting*, Canterbury, UK.
- 2001 'Modulation of plant carbon metabolism and growth by water availability- hydraulic and chemical signals'. *VII Congreso Hispano-Luso de Fisiologia Vegetal*. Badajoz. Spain.
- 2001 'Leaf chlorophyll fluorescence- a tool for plant quality assessment'. *COST 843, WG3 Meeting*. Lisbon.
- 2001 'Os sistemas geosfera-biosfera: evolução natural e influências antropomórficas' Mesa Redonda. *V Reunião do Quaternário Ibérico*. Lisboa.
- 1999 'Carbon Metabolism: impacts f Global Change phenomena in plant response'. *Mediterranean Ecosystems under threat: monitoring and protecting strategies*. MEDTRAIN. An advanced training course. Alghero. Sardegna. Italy.
- 1998 'Ecofisiologia e alterações globais - CO<sub>2</sub> e clima'. 3<sup>a</sup> Reunião Nacional da Sociedade de Ecologia (SPECO). Faro. Portugal.
- 1997 'O aumento de CO<sub>2</sub> na atmosfera e a fotossínteses - o carbono como substrato e como regulador da actividade fotossintética'. *V Congreso Hispano-Luso de Fisiologia Vegetal* Cordova. Spain.
- 1996 ' Ecofisiologia Vegetal e Ecologia- algumas reflexões'. 1<sup>a</sup> Reunião Nacional da Sociedade de Ecologia (SPECO)
- 1995 'Regulação do metabolismo do carbono e do crescimento das plantas em resposta a alterações climáticas globais'. Plenary Lecture on the *IV Congresso Luso- Espanhol de Fisiologia Vegetal* Lisboa. Portugal.
- 1995 'Assimilação do carbono pelas plantas em condições de stress hídrico e térmico - regulação ao nível da folha e da planta inteira' (Plenary Lecture). *V Congresso Brasileiro de Fisiologia Vegetal*. Lavras. Minas Gerais. Brasil.

- 1992. 'Heat-stress effects on photosynthesis of two Mediterranean species'. Workshop on "Field ecophysiological techniques for crop improvement in semi-arid areas". Roma, Itália.
- 1992 - Environmental constraints to photosynthesis in "ex-vitro" plants. Conference *Physiology, growth and development of plants in culture*. Lancaster. UK.
- 1991 'Gas exchange measurements under natural and controlled conditions in plants subjected to water stress'. Workshop *Field Instrumentation for Environmental Physiology*. S. Miniato. Italy.
- 1989 'Use of oxygen electrode with heterobaric leaves and water stress. Field instrumentations for environmental physiology'. SEB/FESPP Workshop "Field Instrumentation for Environmental Physiology". Faro, Portugal.
- 1989 'Changes induced by water stress on carbon assimilation and partitioning at the leaf level'. *International Seminar on Photosynthesis and Growth under Mediterranean Conditions: influence of dryness and salinity*. OCDE/CIHEAM. Oeiras, Portugal.

#### 'Oração de Sapiência' (Opening of the ISA 2004-2005 activities)

« O Sequestro do Carbono pelos Ecossistemas Terrestres e as Mudanças Globais do Ambiente – lições da investigação na Amazónia.»

#### Invited Seminars

- 2012 « Physiological diversity in grapevine – exploiting its potential for adaptation to environmental stresses». Seminário "Stress hídrico em viticultura de climas quentes". Escola Superior de Biotecnologia da Universidade Católica Portuguesa (ESB-UCP). 25 Maio 2012.
- 2011 «Resistência à secura nas plantas superiores - avanços da ciência fundamental e aplicações práticas». Seminário DEF. ISA. Março 2011.
- 2010 Alterações climáticas e mitigação dos seus efeitos na agricultura – o papel da diversidade genética. Seminário Ano da Biodiversidade, ISA, UTL. Maio 2010.
- 2008 'Mudanças Globais no Ambiente e Produtividade Vegetal' no Seminário "Os Dias do Desenvolvimento 2008", organized by IPAD.
- 2006 'As Mudanças Globais no Ambiente. Factos e Mitos'. Ciclo de Conferências da AEA. ISA, UTL.
- 2005 'Understanding carbon assimilation and plant growth under water deficits: can we apply some of the concepts to crop management?' Ciclo de Conferências ITQB/ISA.
- 2005 'Realizing the Promise and Potential of African Agriculture: Science and technology strategies for improving agricultural productivity and food security in Africa'. Academia de Ciências de Lisboa.
- 2004 'O Sequestro do Carbono pelos Ecossistemas Terrestres e as Mudanças Globais no Ambiente'. Oração de sapiência na abertura do ano lectivo 2004/2005 ISA, UTL.

- 1997 'Respostas Fisiológicas à temperatura elevada em plantas desenvolvidas numa atmosfera enriquecida em CO<sub>2</sub>'. Academia de Ciências de Lisboa.
- 1997 'Interactive effects of elevated CO<sub>2</sub> and high temperatures on plant functioning' University of Tubingen. Germany.
- 1996 'Regulation of gas exchange (carbon and water vapour) in grapevines'. Academy of Agriculture Sciences and Forestry. Beijing. China.
- 1996 'Photoprotection and photoinhibition in plants growing under Mediterranean conditions'. Aula Dei. Zaragoza. Spain.
- 1996 'Fisiologia das Plantas em Condições Adversas do Meio: o caso Mediterrânico'. Academia de Ciências de Lisboa.
- 1995 - "Elevated CO<sub>2</sub> modifies the response to high temperatures in *Quercus suber* seedlings". Dep. Baumphysiologie. Univ. Freiburg. Germany.
- 1994 -"O aumento do CO<sub>2</sub> na atmosfera e o crescimento das plantas - respostas a curto e a médio prazo". Dep. Florestal. ISA.
- 1994 -"Metabolic regulations of plants under environmental stresses". Univ. Sheffield
- 1994 -"Respostas das plantas ao aumento de dióxido de carbono na atmosfera - regulação do metabolismo do carbono e do crescimento". Academia de Ciências de Lisboa
- 1993 - "Photosynthetic Response to High Temperature in Mediterranean Species". Dep. Plant Ecology and Evolutionary Biology, Univ. Utrecht. The Netherlands.
- 1993 -"Respostas fisiológicas das plantas a condições adversas: stress hídrico, luminoso e térmico". Univ. Évora.
- 1993 - "L'activité photosynthétique chez la vigne en conditions de contraintes de l'environnement". Centre de Recherches Bordeaux. France.
- 1992 - 'Natural Resource Development and Utilization '. European Community Coordination Workshop. Wageningen. The Netherlands.
- 1990 -"Carbon fixation and partitioning under water stress conditions". Dep. Plant Biology. Universidade de Groningen. The Netherlands.
- 1990 - "Fotossíntese e Produtividade Vegetal". Universidade do Algarve
- 1986 -"Photosynthesis, productivity and partitioning of assimilates in *Vitis vinifera*". Joint Cost / EC air pollution and CO<sub>2</sub> programme. Univ. de Groningen. The Netherlands.
- 1981 "Estudo do transporte dos produtos de assimilação nas plantas utilizando Carbono 14". LNETI, Sacavém.

## PAPERS IN JOURNALS OF THE JCR

1. REGALADO A, PIERRI CL, BITETTO M, LAERA VL, PIMENTEL C, FRANCISCO R, PASSARINHO J, CHAVES MM, AGRIMI G. 2012 Characterization of mitochondrial dicarboxylate/tricarboxylate transporters from grape berries. *Planta* (accepted).
2. ZARROUK O, FRANCISCO R, PINTÓ-MARIJUAN M, BROSSA R, SANTOS RR, PINHEIRO C, COSTA JM, LOPES C, CHAVES MM. 2012 Impact of irrigation regime on berry development and flavonoids composition in Aragonez (Syn. Tempranillo) grapevine. *Agricultural Water Management* 114,18-29.
3. SILVA LL, RAGAB R, DUARTE I, LOURENÇO E, SIMÕES N, CHAVES MM. 2012, Calibration and validation of SALTMED model under dry and wet year conditions using chickpea field data from Southern Portugal. *Irrigation Science* DOI 10.1007/s00271-012-0341-5.
4. VAZ M, COCHARD H, GAZARINI L, GRAÇA J, CHAVES M M, PEREIRA J S 2012 Cork oak (*Quercus suber* L.) seedlings acclimate to elevated CO<sub>2</sub> and water stress: photosynthesis, growth, wood anatomy and hydraulic conductivity. *Trees*, DOI 10.1007/s00468-012-0691-x
5. COSTA JM, ORTUÑO M.F., LOPES C. M, CHAVES MM 2012 Grapevine varieties exhibiting differences in stomatal response to water deficit. *Functional Plant Biology*, 2012, 39, 179–189. <http://dx.doi.org/10.1071/FP11156>
6. SHVALEVA A, LOBO-DO-VALE R, CRUZ C, CASTALDI S, ROSA AP, CHAVES MM, PEREIRA JS. 2011 Soil-atmosphere greenhouse gases (CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O) exchange in evergreen oak woodland in southern Portugal. *Plant Soil Environ.*, 57, 471–477.
7. CONDE A, CHAVES M M, GERÓS H 2011 "Membrane Transport, Sensing And Signaling In Plant Adaptation To Environmental Stress" *Plant and Cell Physiology* 52, 1583–1602. doi:10.1093/pcp/pcr107. 1.
8. CHAVES I, PASSARINHO JAP, CAPITÃO C, CHAVES MM, FEVEREIRO P AND RICARDO CPP 2011 Temperature stress effects in *Quercus suber* leaf metabolism. *J Plant Physiology* 168 (15): 1729-1734 <http://dx.doi.org/10.1016/j.jplph.2011.05.013>.
9. PINHEIRO C, ANTÓNIO C, ORTUÑO MF, DOBREV PI, HARTUNG W, THOMAS-OATES J, RICARDO CP, VANKOVA R, CHAVES MM, WILSON JC. 2011 Initial water deficit effects on *Lupinus albus* photosynthetic Performance, carbon metabolism, and hormonal balance:

- Metabolic reorganization prior to early stress responses. *Journal of Experimental Botany* **6**, 4965-4974. doi:10.1093/jxb/err194
10. SILVA E, BATISTA S, CAETANO L, CEREJEIRA MJ, CHAVES M & JACOBSEN SE. 2011. Integrated approach for the quality assessment of freshwater resources in a vineyard area (South Portugal). *Environ Monit Assess*, **176**: 331-341. DOI 10.1007/s10661-010-1586-1
  11. CHAVES MM, COSTA JM AND SAIBO NJM 2011 Recent Advances in Photosynthesis under Drought and Salinity. *Advances in Botanical Research*, **57**, 49- 104. DOI: 10.1016/B978-0-12-387692-8.00003-5.
  12. LOPES C. M, SANTOS T. P., RODRIGUES ML, MONTEIRO A, COSTA MC, CHAVES M. M. 2011 Combining cover cropping with deficit irrigation in a Mediterranean low vigor vineyard. *Scientia Horticulturae* **129**, 603-612 doi:10.1016/j.scienta.2011.04.033
  13. PINHEIRO C AND CHAVES MM 2011 Photosynthesis and drought: can we make metabolic connections from available data? *Journal of Experimental Botany*. **62**, 869-882. DOI: 10.1093/JXB/ERQ340.
  14. VAZ M, MAROCO J, RIBEIRO N, GAZARINI L C, PEREIRA J S, CHAVES M M 2011. Leaf-level responses to light in two co-occurring *Quercus* (*Quercus ilex* and *Quercus suber*): leaf structure, chemical composition and photosynthesis. *Agroforest Syst* **82**: 173-181. DOI 10.1007/s10457-010-9343-6
  15. GRANT OM, TRONINA L, RAMALHO JC, KURZ-BESSON C, LOBO-DO-VALE R, PEREIRA JS, JONES HG, CHAVES MM 2010. The impact of drought on leaf physiology of *Quercus suber* L. trees: comparison of an extreme drought event with chronic rainfall reduction. *Journal of Experimental Botany*. **61**, 4361-4371. doi: 10.1093/jxb/erq239
  16. METCALFE D. B., MEIR P., ARAGAO L., LOBO-DO-VALE R., GALBRAITH D., FISHER R. A., CHAVES M. M., MAROCO J. P., DA COSTA A. C. L., DE ALMEIDA S. S., BRAGA A. P., GONCALVES P. H. L., DE ATHAYDES J., DA COSTA M., PORTELA T. T. B., DE OLIVEIRA A. A. R., MALHI Y. AND WILLIAMS M. 2010. Shifts in plant respiration and carbon use efficiency at a large-scale drought experiment in the eastern amazon. *New Phytologist* **187**(3): 608-621.
  17. VAZ, M M, PEREIRA J S, GAZARINI L C, DAVID T S, DAVID J S, RODRIGUES A, CHAVES M M 2010. Drought-induced photosynthetic inhibition and autumn recovery in two Mediterranean oak species (*Quercus ilex* and *Quercus suber*). *Tree Physiology* **30**, 946-956. doi: 10.1093/treephys/tpq044.
  18. CONDE A, CHAUMONT F, DIALLINAS G, CHAVES M, GERÓS H. 2010. Transporters, channels, or simple diffusion? Dogmas, atypical roles and complexity in transport systems. *The International Journal of Biochemistry & Cell Biology*. **42**, 857-868.
  19. METCALFE D, DO VALE R, CHAVES M, MAROCO J, ARAGAO L, MALHI Y, DA COSTA A, BRAGA A, GONCALVES P, DE ATHAYDES, J MDA COSTA, S S ALMEIDA, C CAMPBELL, V HURRY, M WILLIAMS AND P MEIR8 2010 Impacts of experimentally imposed drought on leaf respiration and

- morphology in an Amazon rainforest. *Functional Ecology* 24, 524–533. doi: 10.1111/j.1365-2435.2009.01683.x.
20. CHAVES MM, DAVIES WJ 2010 Drought effects and water use efficiency: improving crop production in dry environments. *Functional Plant Biology*, 2010, 37, iii–vi
  21. CHAVES MM, ZARROUK O, FRANCISCO R, COSTA JM, SANTOS T, REGALADO AP, RODRIGUES ML, LOPES CM. 2010. Grapevine under deficit irrigation – hints from physiological and molecular data. *Annals of botany* 105: 661–676. doi: 10.1093/aob/mcq030.
  22. NETTO AT, CAMPOSTRINI E, AZEVEDO LC, SOUZA MA, RAMALHO JC, CHAVES MM 2009 Morphological analysis and photosynthetic performance of improved papaya genotypes. *Brazilian J Plant Physiol* 21, 209–222.
  23. CERASOLI S, MCGUIRE M A, FARIA J, MOURATO M, SCHMIDT M, PEREIRA JS, CHAVES M M, AND TESKEY R O. 2009 CO<sub>2</sub> efflux, CO<sub>2</sub> concentration and photosynthetic re-fixation in stems of *Eucalyptus globulus* (Labill.). *J. Exp. Botany* 60, 99–105
  24. CHAVES, M.M., FLEXAS J, PINHEIRO C 2009 Photosynthesis under drought and salt Stress: Regulation mechanisms from whole plant to cell. *Annals of Botany* 103, 551–560.
  25. COSTA E SILVA F, SHVALEVA A, BROETTO F, ORTUÑO M.F., RODRIGUES ML, ALMEIDA MH, CHAVES MM, PEREIRA JS 2009. Acclimation to short-term low temperatures in two *Eucalyptus globulus* clones with contrasting drought resistance. *Tree Physiology* 29, 77–86
  26. RODRIGUES ML, SANTOS T. P., RODRIGUES A P, SOUZA C R, LOPES CM; MAROCO J P, PEREIRA J S, CHAVES M M 2008 Hydraulic and chemical signalling in the regulation of stomatal conductance and plant water use of field grapevines growing under deficit irrigation. *Functional Plant Biology* 35 (7) 565–579.
  27. ANTONIO C, PINHEIRO C, CHAVES MM, RICARDO CP, ORTUÑO MF, THOMAS-OATES J. 2008 Analysis of carbohydrates in *Lupinus albus* stems on imposition of water deficit, using porous graphitic carbon liquid chromatography-electrospray ionization mass spectrometry. *J Chromatogr A*. 1187(1-2):111–8.
  28. PINHEIRO C, CRUZ DE CARVALHO M H, BARTELS D, RICARDO C P, CHAVES M M 2008 Dehydrins in *Lupinus albus*: pattern of protein accumulation in response to drought. *Functional Plant Biology* 35, 85–91.
  29. SHVALEVA A COSTA E SILVA F, SCOTTI P, MOUHSSIN O, HAUSMAN J F, GUIGNARD C, RAMOS P, ALMEIDA M. H, RODRIGUES M. L, PEREIRA J S., CHAVES M. M 2008 Physiological and biochemical responses to low non-freezing temperature of two *Eucalyptus globulus* clones differing in drought resistance. *Ann Forest Science* 65, 204, 1–10.



30. COSTA E SILVA F, SHVALEVA A, ALMEIDA MH, CHAVES MM, PEREIRA JS 2007. Responses to chilling of two *Eucalyptus globulus* clones with contrasting drought resistance. *Functional Plant Biology* **34**, 793–802.
31. COSTA J.M., CHAVES M.M., ORTUÑO, M.F. 2007 Deficit irrigation as a strategy to save water: physiology and potential application to horticulture. *Journal of Integrative Plant Biology* **49** (10):1421-1434.
32. CHAVES M.M., SANTOS, T., SOUZA, C.R., ORTUÑO, M.F., RODRIGUES, M.L., LOPES, C., MAROCO, J., PEREIRA, J.S. 2007 Deficit irrigation in grapevine improves water-use efficiency while controlling vigour and production quality *Ann Appl Biol* **150**, 237-252.
33. GRANT OM, TRONINA L, JONES HG, CHAVES MM, 2007 Thermal imaging successfully detects stress-related differences between grapevine canopies receiving different irrigation. *J exp Botany* **58**, 815-825.
34. SANTOS, T., LOPES, C., RODRIGUES, M.L, SOUZA, C.R., MAROCO, J., PEREIRA, J.S., SILVA J. R., CHAVES, M.M 2007 Partial rootzone drying irrigation affects cluster microclimate improving fruit composition of ‘Moscatel’ field-grown grapevines. *Scientia Horticulturae* **112**, 312-330.
35. DAVID TS, HENRIQUES MO, KURZ-BESSON C, NUNES J, VALENTE F, VAZ M, PEREIRA JS, SIEGWOLF R, CHAVES MM, GAZARINI LC, DAVID J S. 2007 Water use strategies in two co-occurring Mediterranean evergreen oaks: surviving the summer drought. *Tree Physiology* **27**, 793–803.
36. GRANT OM, CHAVES MM, JONES HG 2006 Optimising thermal imaging as a technique for detecting stomatal closure induced by drought stress under greenhouse conditions. *Physiologia Plantarum* **127**, 507-518.
37. OSÓRIO M.L., BREIA E., RODRIGUES A., OSÓRIO J., LE ROUX X., DAUDET F. A., FERREIRA I., CHAVES M. M. 2006 Limitations to carbon assimilation by mild drought in nectarine trees growing under field conditions. *Environmental and Experimental Botany*, **55**, 235-247
38. SHVALEVA A, COSTA E SILVA F, BREIA E, L JOUVE, JF NAUSMAN, ALMEIDA MH, MAROCO JP, PEREIRA JS, CHAVES MM 2006 Drought resistance mechanisms in two *Eucalyptus globulus* L. *Tree Physiology*, **26**, 239-248.
39. KURZ-BESSON C, OTIENO D, LOBO DO VALE R, SIEGWOLF R, SCHMIDT M, HERD A, NOGUEIRA C, SOARES DAVID T, SOARES DAVID J, TENHUNEN J, SANTOS PEREIRA J, CHAVES MM. 2006 Hydraulic lift in cork oak trees in a savannah-type Mediterranean ecosystem and its contribution to the local water balance. *Plant and Soil*, **282**, 361 – 378.
40. LEINONEN I, GRANT OM, TAGLIAVIA CPP, MM CHAVES, JONES HG. 2006 Estimating stomatal conductance with thermal imagery. *Plant, Cell and Environment* **29**, 1508–1518.
41. SOUZA, C.R., MAROCO, J., SANTOS, T., RODRIGUES, M.L, LOPES, C., PEREIRA, J.S., CHAVES, M.M. 2005 Control of stomatal aperture and carbon uptake by deficit irrigation in two grapevine cultivars. *Agriculture, Ecosystems & Environment* **106**, 261-274.

42. CENTRITTO M., WAHBI S., SERRAJ R., CHAVES, M.M. 2005. Effects of partial rootzone drying (PRD) on adult olive tree (*Olea europaea*) in field conditions under arid climate. II. Photosynthetic responses. *Agriculture, Ecosystems & Environment* **106**, 303-311.
43. CARVALHO, I. S., RICARDO, C.P.P. & CHAVES, M. M. 2005. Seeds chemical composition of two lupines (*Lupinus albus* and *Lupinus mutabilis*) influenced by water stress. *J Agronomy & Crop Science* **191**, 95-98.
44. DAMESIN, C., BARBAROUX C., BERVEILLER D., LELARGE C., CHAVES M.M., MAGUAS C., MAIA R., PONTAILLER J-Y. 2005 The carbon isotope composition of CO<sub>2</sub> respired by trunks: comparison of four sampling methods. *Rapid Communications in Mass Spectrometry* **19**,369-374.
45. SOUZA, C.R., MAROCO, J., SANTOS, T., RODRIGUES, M.L, LOPES, C., PEREIRA, J.S., CHAVES, M.M. 2005. Impact of deficit irrigation on water use efficiency and carbon isotope composition ( $\delta^{13}\text{C}$ ) of field-grown grapevines under Mediterranean Climate. *J. Exp. Botany* **56**, 2163-2172.
46. SANTOS, T., SOUZA, C.R., LOPES, C., RODRIGUES, M.L, MAROCO, J., PEREIRA, J.S., SILVA J. R., CHAVES, M.M 2005 Partial root-zone drying irrigation affects cluster microclimate improving fruit composition of Castelão field-grown grapevines. *Vitis* 117-125.
47. SOUZA, C.R., MAROCO, J., SANTOS, T., RODRIGUES, M.L, LOPES, C., PEREIRA, J.S., CHAVES, M.M. 2005. Grape berry metabolism in field-grown grapevines exposed to different irrigation strategies. *Vitis* 103-109.
48. PINHEIRO, C., CARVALHO I, RODRIGUES A P CHAVES, M.M., RICARDO, C.P.P. 2005 Lupin seed development under water stress conditions. *J. Exp. Botany*, **56**, 2705-2712.
49. CERASOLI S., SCARTAZZA A., BRUGNOLI E., CHAVES M.M. AND PEREIRA J.S. 2004 The effects of a partial defoliation on carbon and nitrogen uptake and partitioning in two-year-old cork oak (*Quercus suber* L.) seedlings. *Tree Physiology* **24**, 83-90.
50. CARVALHO, I. S., RICARDO, C.P.P. & CHAVES, M. M. 2004. Quality and distribution of assimilates within the whole plant of lupines (*L. albus* and *L. mutabilis*) influenced by water stress. *J Agronomy & Crop Science*, **190**, 205-210.
51. CERASOLI S., MAILLARD P., SCARTAZZA A., BRUGNOLI E., CHAVES M.M. AND PEREIRA J. S. 2004 Carbon and nitrogen winter storage and remobilisation during seasonal flush growth in two-year-old cork oak (*Quercus suber* L.) saplings. *Ann F Science* **61**, 721-729.
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53. CHAVES, M.M., OLIVEIRA M.M. 2004 Mechanisms underlying plant resilience to water deficits - Prospects for water-saving agriculture. *J. Exp. Botany* **55**, 2365-2384.
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- 30**, 239-264. (commissioned review paper; top 1% within its field according to *Essential Science Indicators*)
55. SOUZA, C.R., MAROCO, J., SANTOS, T., RODRIGUES, M.L, LOPES, C., PEREIRA, J.S., CHAVES, M.M. 2003. Partial root-drying: Effects on the physiology of grapevines (*Vitis vinifera* ) growing under field conditions. *Functional Plant Biology*, **30**, 653-662.
  56. SANTOS, T., SOUZA, C.R., LOPES, C., RODRIGUES, M.L, MAROCO, J., PEREIRA, J.S., SILVA J. R., CHAVES, M.M. 2003. Partial root-drying: Effects on growth and fruit quality of field grown grapevines (*Vitis vinifera*, L.). *Functional Plant Biology*, **30**, 663-671.
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  60. JONES, H.G., STOLL, M., SANTOS, T., SOUSA, C., CHAVES, M.M. & GRANT, O.M. 2002. Use of infra-red thermography for monitoring stomatal closure in the field: application to grapevine. *J. Exp. Botany*. **53**, 2249-2260.
  61. LE ROUX, X., WALCROFT, A.S., DAUDET, F.A., SINOQUET, H., CHAVES, M.M., RODRIGUES, A. & OSÓRIO, L. 2001. Photosynthetic light acclimation in peach tree leaves: importance of changes in mass-to-area ratio, nitrogen concentration, and leaf nitrogen partitioning. *Tree Physiology*, **21**, 377-386.
  62. PINHEIRO, C., CHAVES, M.M., RICARDO, C.P.P. 2001 Alterations in carbon and nitrogen metabolism induced by water deficit in the stem and leaves of *Lupinus albus* L.. *J. Exp. Botany*, **52**, 1063-1070.
  63. CHAVES, M.M., PANTSCHITZ, E. & SCHULZE, E. -D. 2001 Growth and photosynthetic carbon metabolism in tobacco plants under an oscillating CO<sub>2</sub>-concentration in the atmosphere. *Plant Biology*, **3**, 1-9.
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  65. CARVALHO, L.C., OSÓRIO, M.L., CHAVES, M.M. & AMÂNCIO, S. 2001 Photosynthetic competence during acclimation: Chlorophyll fluorescence as an indicator of photosynthetic functioning of *in vitro* grapevine and chestnut plantlets under *ex vitro* acclimatization. *Plant Cell, Tissue and Organ Culture*, **67**, 271-280.

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