




2013  
Activities  
Report

CITAB

Compiled by  
CITAB Executive  
Committee

Edited by  
Samantha Jane Hughes  
& Lígia Pinto

-  Sustainable Agro-food Chains - SAC
-  EcoinTEGRITY - EI
-  Biosystems Engineering - BE

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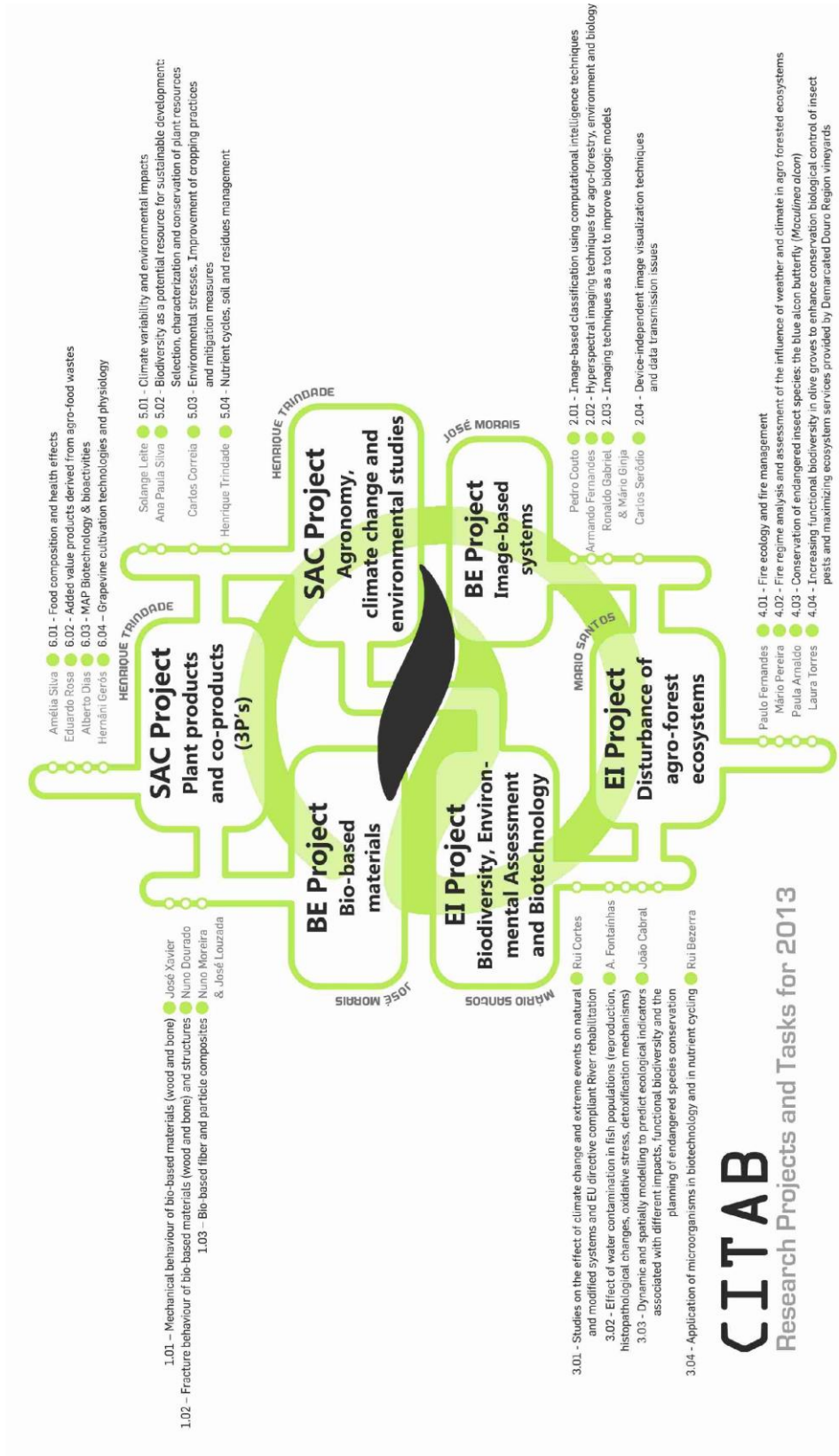
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# 1 Executive Summary

Over the last 3 years, CITAB has implemented a structured, ongoing strategy to achieve a FCT classification of “Excellent” through a coordinated series of actions. The objectives for 2013, developed to continue to consolidate CITABs development strategy, can be summarised in the following list:

- 🕒 Formal creation of a strategic consortium for northern Portugal, integrating both national FCT funded research centres and associated laboratories and public and private sector stakeholders (Portugal Foods, Douro Wine Cluster);
- 🕒 Continued internationalisation efforts by procuring new contacts and strengthening existing international links, in particular with Brazil, China and India;
- 🕒 Development of FCT funded international doctoral programmes with national and international research centres, universities and stakeholders;
- 🕒 Continued efforts to increase interdisciplinary actions within and between CITAB’s Groups, in particular via the actions described above;
- 🕒 Increase scientific productivity in JCR Journals in top range of quartiles and in other publications;
- 🕒 Continue to offer scholarships at CITAB in tasks outlined research line projects;
- 🕒 Continued collaboration with key stakeholders;
- 🕒 Develop planned, strategic outreach activities that capture the interest of young scientists and promote societal responsibility and knowledge.



## 2 Objectives and achievements

### 2.1 Unit description

CITAB's core activities are centred on interdisciplinary research on agro-food, forestry and the environment, with input from engineering technologies to enhance development of agro-food and forestry production chains in Portugal.

CITAB's research activities are organized into 6 multidisciplinary projects to optimise research group expertise via the development of integrated, multidisciplinary research (see organigram). This approach maximises participation of integrated members and collaborators.

CITAB's activities rely on the contribution of integrated members (members with a PhD) and collaborators (members without PhD), selected according to international benchmarking criteria. Most of the CITAB members are primarily lecturers; therefore the Unit supports post-graduate courses offered by the host institution and others centres of learning.

CITAB is managed using a bottom-up approach. The Directorate (1 Director and 2 Vice-Directors) is supported by the Executive Committee (ExCo; 6 members- 2 from each Working Group) forming a two way link between CITAB members and the Directorate concerning policy orientation defined by the Directorate.

The ExCo is also responsible for compiling information and collaborating in actions that promote the visibility of the Unit. Both the Directorate and the ExCo meet approximately once a month. Research group members also hold regular meetings to evaluate group progress according to the Plan of Activities for the current year. The Scientific Council meets a minimum of 4 times a year, as stipulated by regulations. Given the considerable size of the Unit, a secretary has been contracted to deal with all administrative duties and provide support to the Directorate and the ExCo.

### 2.2 General objectives

CITAB'S 2013 general objective continued to promote scientific excellence through structures strategic actions such as internationalization by promoting mobility of researchers, receiving visiting researchers, increasing links with stakeholders and improving dissemination of results and social responsibility by outreach activities.

A major CITAB goal was to build a high quality partnership to launch an international double diploma PhD Programme to be submitted to and financed by the FCT funding programme. The PhD programme aiming for leadership on the topic "Agricultural production chains - from fork to farm" was completed and submitted for funding in early 2013. The submitted proposal was successful and is now funded by the FCT. Focusing on other leading research areas of CITAB, the preparation of two other

international PhD programmes was started in 2013 in “Biodiversity and Environmental Sustainability” and “New technologies applied to agriculture”.

External funding was another objective which was achieved with a successful submission as coordinators of a FP7 project, involving 17 partners and 10 countries.

A single edition of the CITAB newsletter was published in 2013, divulging the centre’s activities to actual and potential international partners. Outreach activities continued to be successful over 2013, comprising actions aimed towards the scientific community, the private sector, the general public but focusing in particular on capturing the interest of potential young scientists in the region’s secondary schools. The objectives of increasing the cooperation with stakeholders had several successful initiatives.

Another important objective was to start a professional dissemination programme of the activities and major results of CITAB which should have impact at national and particularly at international level.

## **2.3 Scientific objectives**

Scientific activities and objectives are to be developed within the 6 structural projects and their respective tasks (see organigram). The tasks are developed in order to use, whenever possible, novel approaches that involve interaction and inputs from experts in areas of engineering and communication technology. These interactions give added value and advance science in CITABs key areas of agro-food, forestry and the environment, using innovative methods such as signal and image processing, biosensing and remote sensing to better understand how agricultural activities drive environmental change at different scales of the ecosystem and the organism.

## **2.4 Main achievements during 2013**

The main achievements of CITAB’s research over 2013 are summarised for each group.

### **2.4.1 Sustainable Agro-food Chains**

Special attention was paid to climate change and mitigation measures, as well as biodiversity preservation. An innovative perspective on mechanisms underlying droughts in Portugal was developed. Climate change projections for precipitation/temperature, for bioclimatic indices and for grapevine yield in several Wine Regions in Portugal were produced (Douro region > 26 000 ha). Pioneering, very high-resolution viticultural zoning was developed under current & future climate scenarios in Portugal. A kaolin-based particle film to prevent leaf sunburn damage and drought stress on grapevines was tested which will have a great economic impact. To improve sustainability in olive groves, SAC research has shown that cover crops in

rainfed systems benefit soil quality and improve biodiversity. Chestnut clonal selection for cvs. Judia has been established from the best Tras-os-Montes genotypes.

Hazelnut germplasm studies, conducted as part of a European project, completed the descriptive data of cultivars in collections allowing better selection of hazelnut varieties, which are potentially important sources of genes tolerant to new environment conditions, pathogenic diseases resistance and/or nutritional characteristics, to be used in future EU level breeding programmes (75,000 ha of hazelnuts). It was also demonstrated that the application of *Bacillus velezensis* simultaneously increased P plant uptake and crop yield, resulting in greater root system development, photosynthetic rate and phenol content and also conferring greater protection against ink disease (ink disease can affect about 6,000 to 7,000 ha of the national territory). A close relation between degree-day and chestnut quality was found regarding the stresses imposed by high temperatures and extreme drought period.

GHG emissions from dairy cattle building, animal slurries, and paddy rice production (25 000ha) were evaluated and results contributed to a 10% reduction in the national emissions inventory, helping to meet European targets. From a range of 7 plant pathogenic bacteria, it was found that 5 isothiocyanates could inhibit their growth and activity. Similarly a promising result was achieved with 14 human pathogenic bacteria opening the possibility of further explore these results in pharmacology. Phytochemicals with nematicidal activity against pine wood nematode (which affects  $\pm$  10 000 ha) were identified from Brassica species. Reduction of chemical inputs to suppress phytopathogenic fungi was achieved after composting phytochemical rich plant residues (e.g. olive leaves, brassica, grape stems, total  $\pm$  300 000 tonnes).

There have been several achievements on the knowledge of the clinical efficiency of Portuguese traditional plants used in diabetes as well as the associated toxicity. Specific achievements on health related phytochemicals are; the anticancer effects (colorectal cancer cells) from *Salvia*, *Hypericum* and olive leaves extracts and some of their phenolic compounds; the anti-proliferative effect of endopolysaccharides extracted from the fungi *Ganoderma resinaceum*, *Phlebia rufa* and *Tramete*; the neuroprotective properties of extracts and compounds from *H. perforatum*; the anti-ageing and antioxidant defences in human fibroblasts, from Curcumin; production of biopolymers from molecular farming in lettuce. New market products were developed from the SAC research line such as biofunctional textiles using resveratrol and other plant extracts and nanoencapsulation of plant bioactives. At cellular level, a new model for biochemical and biotechnological applications was developed following purification of intact, functional protoplast and vacuole populations from grape cells; this will help to study the effects of abiotic stress in several crops, in particular vine, chestnuts and olives.

#### 2.4.2 Eointegrity Group

Main achievements include development of integrative ecological assessment tool for aquatic ecosystems, by combining environmental bioindicators and biomarkers to



detect the multiple stressors occurring in aquatic systems. Biomarkers for contamination assessment of fish and new applications on macroinvertebrate species were validated to detect the effects of xenobiotic compounds and tested to assess toxic effects of heavy metals and effect of endocrine disrupting compounds in developmental and reproductive parameters of fish. These developments are fundamental to understand how new pollutants disrupt aquatic environmental processes and can be used in biomonitoring programs as early warning signs of population decline and as an ecologically relevant endpoint, contributing to the preservation of ecosystem integrity. Monitoring was successfully linked with practical river restoration initiatives, especially the improvement of connectivity in streams and rivers in north and south Portugal. These findings have particular relevance for EU Water Framework Directive (WFD) monitoring programmes. Studies are developed on the effect of climate and land use change and extreme events on natural and modified systems and WFD compliant water resource management. Restoration and adaptation measures of aquatic ecosystems in accordance with WFD demands is an EI expert area with contracts with private and state organizations to the value of 780,000€.

A main achievement in Dynamic and spatially dynamic modelling to predict ecological indicators associated with different impacts, functional biodiversity and the planning of endangered species conservation during 2013 was the development of a unique and novel spatially explicit modelling framework, designated by the acronym StDM (Stochastic Dynamic Methodology), which predicts ecological indicators responses to realistic scenarios of environmental changes. This was done by integrating Multi-Model Inference statistical analysis, Stochastic-Dynamic Modelling and Geographic Information Systems under a common framework, relating ecological trends to changes in surrounding habitats and environmental conditions at local and regional levels. The published results demonstrate StDM reliability in capturing the ecosystem dynamics by predicting the behavioural pattern for the key components selected under very complex and variable environmental scenarios, i.e. the alteration of natural systems by human activity.

The immense potential of StDM will ensure collaboration with other national and international institutions via participation in R&D and PhD projects, such as the PTDC/AAG-MAA/4539/2012, "IND\_CHANGE - INDicator-based modelling tools to predict landscape CHANGE and to improve the application of social-ecological research in adaptive land management" and SFRH/BD/77872/2011, "*Modelling the landscape genetic structure and dispersal patterns of endangered Red-billed Chough (Pyrrhocorax pyrrhocorax) populations in Portugal: new insights for conservation and management*".

In Bioremediation of systems affected by anthropogenic disturbance task, EI researchers have thermo chemically characterized biomass from different types of wood and forest wastes and made important contributions to the bioremediation of these refractory materials and agro-food wastes using autochthonous bacteria, yeasts and filamentous fungi in the biodegradation of recalcitrant molecules. There was ongoing research on optimal immobilization procedure of environmental yeast isolates for application in the dephenolization of industry wastewaters (e.g. olive mill wastewaters and winery effluents) and the antimicrobial activity of phenolic extracts, including the best extraction process, from olive mill wastewaters as a waste

valorization process. These studies have a clear contribution to decrease the environmental impact of diverse agro-forest industry effluents on inland waters which generally cause high oxygen deficits

Forest fire behaviour and ecology studies were developed in association with important Mediterranean partners. Results are being applied at European level to predict and prevent wildfire events, thereby increasing regional income. The group also modelled climate change effects in forest and agro-forest systems and possible implications for productivity, fire occurrence and intensity. These highly innovative findings are fundamental for management. The value associated with this research is approx. 510,000€ for the region and Portugal (forests in the Mediterranean Region are estimated to be worth several million Euros).

Main achievement in 2013 in the Conservation of endangered insect species was the identification of several *Maculinea* populations at the Alvão Natural Park. Mark release recaptures were carried out on ten populations and butterfly dispersal was studied. MRR techniques will be used to understand short-distance dispersal in biodiversity conservation. Also, genetic material of the host plant and the butterfly was collected for genetic characterization at Copenhagen University.

Main achievement in 2013 in Increasing functional biodiversity in vineyards: conservation biological control of insect pests & maximizing ecosystem services was the identification assessment of potential ecological infrastructures already existing on vineyard agro-ecosystem for habitat management strategy to maximize the ecosystem services provided in vineyards. The work is progressing beyond enhancing biological control of the European Grapevine Moth (EGVM), *Lobesia botrana*, to the use of endemic plants to provide other ecosystem services. These include aesthetic values and the conservation of biodiversity. A framework was first developed by a landscape analysis mapping the main features of each property within a geographic information system (GIS). This required creation of maps with a common land use database, for each property. A detailed inventory was made of key species of plants, fungi, arthropods, birds, bats and small vertebrates, to better understand their role in the vineyard ecosystem. Using the landscape-level information, we are currently identifying practices to conserve or enhance biological diversity in and around the vineyards.

### **2.4.3 Biosystems Engineering Group**

Important major research achievement as a result of this strategy was knowledge transfer to society in the form of two granted patents for 1) a faster and easier plant clone identification, using hyperspectral imagery and computational intelligence methods, with obvious economical potential for wine producers, breeders, and nursery plant producers; 2) a method to estimate the age of older trees, based on the dendrometric features of the trees and wood guide marks, resulting from a partnership between CITAB and a stakeholder (Oliveiras Milenares). This placed the company in a leader position in the domestic and international market.

Other major achievements, from a collaboration with the Group SAC, are related with image based non-intrusive methodologies; novel classification methodologies were developed through image segmentation techniques using FSs, IVFSs, A-IFs, NN and other computational intelligence techniques for application in agro-products quality assessment contexts. Novel non-invasive hyperspectral image based methodologies were also developed for anthocyanin concentration estimation in vine grapes. These methodologies include the use of computational intelligence techniques and are faster, easier and less expensive than traditional methods; further they do not require laboratory facilities.

Finally BE developed a novel hyperspectral image based methodology for intra growth ring measurement of wood density. This methodology includes computational intelligence techniques and may replace the more demanding technique of X-ray microdensitometry. In the materials science approaches to wood mechanics and in close collaboration with EI Group, a novel method for measuring bending stiffness parameters of MDF panels was developed, which combines full-field slope measurements by the deflectometry technique with the virtual fields method. This was applied to a new type of MDF panels, comprising a mixture of eucalyptus fibres and recycled sugarcane particles, which represent an added value for the industry and contribute to environmental sustainability.

New methods to meticulously characterize wood as an engineering material have an evident impact on the economic value of this material: a new identification method of elastic properties of wood at the growth ring scale (early wood and latewood) by coupling digital image correlation with the virtual fields method; a new method (the compliance based beam method) to evaluate the crack growth resistance curve of wood and wood bonded joints under mode I, mode II and mixed mode I/II loading, based only on the experimental load-displacement curve and a direct identification strategy of cohesive laws for wood and adhesively-bonded wood joints, under pure modes I and II, and mixed-mode I/II. This method is based on the loading-displacement curve and on the crack opening displacement, measured through the digital image correlation technique.

Advanced computational tools based on interface finite elements and cohesive zone modelling, to model the mechanical performance of wood dowel joints and repair solutions using carbon-fibre reinforced plastics and strengthening techniques of dowel type wood connections, based on metallic inserts and CFRP laminates were also developed.

Based on stakeholders specific request and in collaboration of the EI Group, an identification method for variation patterns of wood density components was developed in *Q. faginea*, *Q. suber*, and *Acacia melanoxylon* as well as an evaluation method for the physical, chemical, mechanical and anatomical properties of the *Q. faginea*, *Q. suber*, *Eucalyptus grandis*, and *A. melanoxylon* hardwoods and *P. pinaster* and *P. sylvestris* softwoods, regarding quality assessment and the most suitable uses, of great impact in the wood industry. In close collaboration with SAC Group a new process of storage was designed for the chestnut industry resulting in savings of 1.5 million Euros.

## 2.5 Advanced Training and Courses

SAC researchers were amongst those responsible for the organisation and teaching of workshops on gas emissions from rice paddies (May 2013) and “*Gaseous emissions from animal manure and biowastes – processes and measurement*” (November 2013). The latter was part of a FP7 Marie Curie International Initial Training Network project “ReUseWaste-Recovery and Use of Nutrients, Energy and Organic Matter from Animal Waste”.

Seminars, workshops and courses in *Technologies in Agro-Industry, Biomechanics, Health and Sustainable Environment* and *The Virtual Fields Method* were organised by CITAB-BE researchers over 2013. A workshop on “Bio-based material characterization from full-field measurements” held at UTAD on the 9<sup>th</sup> July has 23 participants.

## 2.6 Outreach activities

Outreach activities promote and divulge the CITAB research activities to key sectors such as the scientific community, stakeholders in both the private and public sector, to budding future scientists that are still at secondary school and the general public. CITAB activities are specifically developed to meet different levels of knowledge according to the needs of the organizations CITAB interacts with. These initiatives allow CITAB to build better cooperative links and involvement with the society and major stakeholders and to disseminate research results.

### 2.6.1 Interacting with stakeholders

To meet one of the objectives of the Unit, CITAB has gradually engaged with stakeholders needs and started to produce real practical results in the last couple of years. This shift implies regular meetings with stakeholders within the different scientific areas covered by CITAB, to define orientations and establish research priorities.

We first meet the Stakeholders Committee to listen to their major orientations, and then meet with specific stakeholders who have presented also the pragmatic approach of research which is intended to improve competitiveness. After establishing a research programme with milestones and goals, regular meetings are held to obtain feedback concerning research results and output and how this can be converted in added-value for the companies.

CITAB gives great importance to developing and maintaining ties with key regional and national stakeholders in order to develop and divulge innovative solutions to their problems. CITAB stakeholder outreach activities are varied covering talks, poster presentations and demonstrations of research that has direct applications to specific sectors.

To bring together research and stakeholders in the wine producing sector CITAB started a cycle of Conferences with the UTAD Department of Agronomy on

“Agriculture in the Douro” in October 2013. The conferences will continue until February 2014.

## 2.6.2 CITAB and the community at large

CITAB/UTAD has played a major role in the SEIVACORGO biodiversity project over the last 3 years and co-organised with the Municipality of Vila Real the first major National Forum on Biodiversity, held at Vila Real’s municipal theatre in March 2013. CITAB-EI researchers hosted the IV World Seminar on the conservation and management of the endangered Red-billed Chough (*Pyrrhocorax pyrrhocorax*) in October 2013.

CITAB researchers actively collaborated in outreach activities with schools and young people over 2013, such “summer campus” in July 2013 and the FCT Science and Technology Week in November 2013. Training courses were also administrated for technicians of the public sector.

Another innovative initiative was the creation of “Biobase Escolar” software to identify plant and bird species. Carried out in collaboration with three high schools of Vila Real, this Ciência Viva funded project in 2013 is coordinated by António Crespi, a CITAB researcher and Coordinator of the UTAD Botanic Garden.

## 3 Funding

	2011	2012	2013	Subtotal
FCT Pluriannual	65.945,10€€	65.085,64€	<b>96.606,26€</b>	227.637,00€
FCT Incentivo	-	-	<b>12.019,00€</b>	12.019,00€
FCT Projects	703.901,91 €	886.153,71€	<b>1.218.184,53€</b>	2.808.240,15€
Other (National)	958.036,58 €	2.091.093,01€	<b>1.658.526,76€</b>	4.707.656,35€
Other (International)	83.388,33 €	219.746,77€	<b>285.078,25€</b>	588.213,35€
Industry (National)	381.443,84 €	213.684,83€	<b>364.418,32€</b>	959.546,98€
Industry (International)	0,00 €	0,00€	<b>0,00€</b>	0,00€
<b>Total</b>	<b>2.126.770,66 €</b>	<b>3.418.93,29€</b>	<b>3.636.846,11€</b>	<b>9.305.325,83€</b>

## 4 General indicators

	2009	2010	2011	2012	2013	Total
Contracted Researchers (Ciência Programme)	4	1	0	0	1	6
Researchers (FTE)	55	66	73	74	77	--
Masters degrees (Master theses completed)	52	15	38	29	48	182
PhDs (PhD theses completed)	11	11	9	6	12	49

## 5 Research Groups

Reference	Group Title
RG-Norte-4033-134	<u>Sustainable Agro-food Chains</u>
RG-Norte-4033-135	<u>Ecointegrity</u>
RG-Norte-4033-136	<u>Biosystems Engineering</u>

### 5.1 Sustainable Agro-food Chains

#### 5.1.1 Group description

Principal Researcher	Francisco Manuel Pereira Peixoto
Research area	Agricultural Sciences
Home Institution	Universidade de Trás-os-Montes e Alto Douro

#### 5.1.2 Funding

	2011	2012	2013
FCT Projects	361.903,30€	361.944,00€	514.582,19 €
Other (National)	525.443,50€	982.314,67€	1.185.107,42 €
Other (International)	80.388,33€	93.922,77€	100.790,25 €
Industry (National)	227.293,40€	14.869,87€	-
Industry (International)	0,00€	0,00€	-
<b>Total</b>	<b>1.195.028,53€</b>	<b>1.453.051,31€</b>	<b>1.800.479,86 €</b>

## 5.1.3 Objectives

### 5.1.3.1 Project #5 - Agronomy, climate change & environmental studies (ACES)

Tasks within this project aim to develop suitable adaptation and mitigation measures for environmental and climate change in the agricultural sector, based on plant studies, numerical atmospheric modelling, studies on environmental impacts on Mediterranean agricultural production chains and the design and improvement of cropping practices.

### 5.1.3.2 Project #6 - Added-value plant products & co-products (APPC)

This project provides effective and sustainable solutions for “greening the food chain” and optimizing both human and animal health. Emphasis is given to Mediterranean crops, medicinal and aromatic plants (MAP) but also to other economically-important plants.

## 5.1.4 Main achievements

SAC main achievements for 2013 are summarised below:

- 🌱 Innovative research on climate change, mitigation measures and biodiversity preservation.
- 🌱 Improve sustainability in olive groves through the use of cover crops.
- 🌱 Chestnut clonal selection for cvs. Judia from Tras-os-Montes genotypes.
- 🌱 Hazelnut germplasm studies on cultivar data for genetic selection
- 🌱 *Bacillus velezensis* application to improve crop yield, P plant uptake and disease resistance
- 🌱 Evaluation of GHG emissions from dairy cattle building, animal slurries, and paddy rice production
- 🌱 Studies on isothiocyanates as inhibitors of plant pathogenic bacteria
- 🌱 Studies on 14 human pathogenic bacteria, with possibilities for further exploration of results in pharmacology.
- 🌱 Study of phytochemicals from Brassica species with nematicidal activity against pine wood nematode.
- 🌱 Reduction of chemical inputs to suppress phytopathogenic fungi by composting phytochemical rich plant



- 🕒 Studies on the clinical efficiency of Portuguese traditional plants used in diabetes as well as the associated toxicity.
- 🕒 New market products such as biofunctional textiles using resveratrol and other plant extracts and nanoencapsulation of plant bioactives.
- 🕒 Development of cellular level model for biochemical and biotechnological applications to study abiotic stress effects in several crops, in particular vine, chestnuts and olives.

#### 5.1.4.1 Mobility

Several SAC researchers were granted LPP-Erasmus Programme Individual Teaching Programme for Teaching Staff Mobility in 2013.

Professor Hernâni Gerós (CITAB-UMinho) collaborated in research on studies solute transport and plant response to abiotic stress and Biomembrane transport at the Université Catholique de Louvain (France).

Professor Ana Lúcia Rebocho Lopes Pinto visited the Department of Agricultural, Forest and Food Sciences and Technologies of University of Turin, at Grugliasco, Italy, in April 2013. The LP/Erasmus staff mobility funded visit allowed exchange of work experiences in common areas (molecular biology, tissue culture and gene transfer in grapes), particularly with staff of Plant Virology Institute, National Research Council (IVV-CN), also located at Grugliasco. During the stay, Professor Pinto gave three seminars to students of Ph. D Program in Agricultural, Forest and Food Sciences (“Dona Maria: a Portuguese table grape for health promotion”; “Transformation and Plant Regeneration in Douro cultivars of *Vitis vinifera*”; “Research in plant biotechnological at DGB-UTAD”).

Professor Aureliano Malheiro was invited to participate in the 'International Week 2013' of the 'CAH Vilentum University of Applied Sciences', Dronten, Netherlands supported by the Erasmus Exchange Program. Professor Malheiro lectured as part of the "International Horticulture and Management" course and discussed CITAB/UTAD and CAH education and research lines with Dutch colleagues

Teresa M.S. Pinto taught theoretical and practical Botany classes in master and doctoral courses, participated in meetings with teachers and researchers to broaden educational and scientific connection and promoted CITAB/UTAD activities while at the Department of Forestry, Agricultural, Nature and Energy Sciences and Technologies (DAFNE) and the Department dei Sistemi per l'Innovazione biologici, agroalimentari and Forestry (DIBAF).

As part of a Bilateral Cooperation between Portugal-Tunisia, Hernâni Gerós (CITAB-UMinho) Hanana Mohsen (Centro de Biotecnologia Borj-Cedria BP 901, Hammam-Lif 2050 Tunísia) collaborated on “Copper uptake and detoxification in grapevine”.

## 5.1.5 Group productivity

### 5.1.5.1 International Projects

SAC researchers participated in 3 international projects during 2013 (see table below):

Project name	CITAB Funding
"Good Practice in Traditional Chinese Medicine Research in the Post-genomic Era". CITAB coordinator: Alberto Dias. Starting date: May 2009, duration: 48 months (FP7-HEALTH-2007-2.1.2-7; Coordination action)	€80.215,00
MoDeM IVM "A Web-based System for real-time Monitoring and Decision Making for Integrated Vineyard Management". CITAB coordinator: Manuel Teles Oliveira. Starting date: January 2011, duration: 24 months (FP7-SME-2010). <a href="http://www.modem-ivm.eu/nqcontent.cfm?a_id=9968">http://www.modem-ivm.eu/nqcontent.cfm?a_id=9968</a>	€82.680,00
ReUseWaste - Recovery and Use of Nutrients, Energy and Organic Matter from Animal Waste. CITAB Coordinator: Henrique Trindade. Starting date: January 2012, duration: 48 months (FP7-PEOPLE-2011-ITN). <a href="http://www.reusewaste.eu/">http://www.reusewaste.eu/</a>	€212.796,06

### 5.1.5.2 National Projects

SAC researchers participated in 36 national projects during 2013:

Project name	CITAB Funding
3DWikiU - Wiki 3D for Urban Environments. CITAB coordinator: João Paulo Moura. Starting date: April 2010. Duration: 36 months (PTDC/EIA-EIA/108982/2008)	N/A
AlertCast - Implementation of a Network Information for promoting chestnut quality. CITAB coordinator: Teresa Pinto. Starting date: January 2012, duration: 36 months. Promotor: Cooperativa Agrícola Penela da Beira, CRL (QREN Vale I&DT 23628).	€33.400,00
Animal slurry management: sustainable practices at field scale. CITAB coordinator: Henrique Trindade. Starting date: January 2012, duration: 36 months (PTDC/AGR-PRO/119428/2010)	€45.000,00
AQUAVITIS - Understanding water transport in <i>Vitis vinifera</i> : biochemical characterization of aquaporins upon their heterologous expression in yeast. CITAB coordinator: Hernâni Gerós (PI: Maria da Conceição Dias – ISA). Starting date: 2010, duration: 42 months. (PTDC/AGR-AAM/099154/2008)	€15.000,00

Project name	CITAB Funding
Caracterização funcional de novos transportadores ABC de planta com regulação diferencial em células especializadas na acumulação de alcalóides medicinais em <i>Catharanthus roseus</i> (L.) G. Don". CITAB coordinator: Hernâni Gerós (PI: Mariana Sottomayor-IBMC). Starting date: 2012. Duration: 36 months. (PTDC/BIA-BCM/119718/2010)	€10.000,00
ClimVineSafe - Short-term climate change mitigation strategies for Mediterranean vineyards. CITAB coordinator: José Moutinho Pereira. Starting date: April 2011, duration: 36 months. (PTDC/AGR-ALI/110877/2009)	€111.456,00
CLIFE - Climate change of precipitation extreme episodes in the Iberian Peninsula and its forcing mechanisms. CITAB coordinator: João Santos. Starting date: January 2011. Duration: 36 months (PTDC/AAC-CLI/111733/2009)	€37.409,00
Cover cropping: a decisive strategy for the sustainable management of rainfed olive orchards. CITAB coordinator: Carlos Manuel Correia. Starting date: March 2010, duration: 36 months. (PTDC/AGR-AAM/098326/2008).	€93.987,00
Developing processes and technologies aiming the production of ink disease resistant chestnut rootstocks, compatible with national varieties certified with molecular markers. CITAB coordinator: José Laranjo. Starting date: January 2012, duration: 36 months. Promotor: Certifruiteiras.com Lda. (ProDer PA 45967)	€15.792,14
EcoDeep - Eco-efficiency and Eco-management in the Agro-Food sector. CITAB coordinator: Henrique Trindade. Starting date: September 2011, duration: 24 months. (QREN - Sistema de Apoio a Ações Coletivas)	€114.625,00
Effect of phytochemicals on organic matter transformation and on key processes of carbon and nitrogen cycles in soil. CITAB coordinator: Henrique Trindade. Starting date: January 2010, duration: 36 months (PTDC/AGR-AAM/102006/2008).	€125.680,00
ERLAND - Direct and indirect impacts of climate change on soil erosion and land degradation in Mediterranean watersheds (FCT, PTDC/AAC-AMB/100520/2008. CITAB coordinator: João Carlos Andrade dos Santos. Starting date: 2010, duration: 36 months	N/A
Functional foods for neuroprotection: a role to <i>Hypericum perforatum</i> (Hyperic-Food). CITAB coordinator: Alberto Carlos Pires Dias. Starting 2010, duration: 36 months (PTDC/ AGR-ALI /105169/2008).	€145.000,00
Good Agricultural practices for the Sustainable Use of Wastewater. CITAB coordinator: Henrique Trindade. Starting date: January 2012. Duration: 36 months (ProRede RuralNacional PA 0400238)	€83.805,69
GrapeBerryFactory - Sugars, acids, phenolics and water on grape berry development and ripenin". PI: Hernâni Gerós. Starting Date: 2010, duration: 42 months. (PTDC/AGR-ALI/100636/2008)	€185.000,00

Project name	CITAB Funding
GreenVitis - Effects of soil management on productivity and sustainability of grape vineyards system. CITAB coordinator: Armindo Afonso Martins. Starting date: January 2012, duration: 36 months. Promotor: Quinta do Vallado Lda. (ProDer PA 43879)	€413.397,29
Infowine - Thematic Networks of Information and Dissemination. CITAB coordinator: Eduardo Rosa. Starting date: January 2011, duration: 36 months (ProDer PA 14301)	€60.739,50
In-Nitro: conceptualizing the effects of increased nitrogen availability in a Mediterranean ecosystem. CITAB coordinator: Henrique Trindade. Starting date: January 2012, duration: 36 months (PTDC/BIA-ECS/122214/2010)	€15.411,00
IrrigOlive - Deficit irrigation on olive, in the region of "Terra Quente Transmonta", to optimization water resources, productivity and olive oil quality. CITAB coordinator: Anabela Silva. Starting date: January 2012, duration: 36 months. Promotor: Aviaz Produção e Comercialização de Vinhos e Azeites, Lda - (ProDer).	€202.257,88
KlimHist - Reconstruction and model simulations of past climate in Portugal using documentary and early instrumental sources (17th-19h). CITAB coordinator: João Santos. Starting date: March 2012, duration: 36 months (PTDC/AAC-CLI/119078/2010)	€19.678,00
Molecular biology of grape berry phenolic maturation. CITAB coordinator: Ana Alexandra Oliveira. Starting date: February 2012. Duration: 36 months (PTDC/AGR-PRO/120264/2010)	€118.742,00
Molecular mechanisms of Agrobacterium recognition and defense activation in recalcitrant plant species. – How do recalcitrant plants avoid T-DNA transfer?. CITAB coordinator: Franklin Gregory. Starting date: December 2011. Duration: 36 months. (PTDC/AGR-GPL/119211/2010)	€153.000,00
Myrtillus with innovation. CITAB coordinator: Ana Paula Silva. Starting date: December 2010, duration: 36 months (QREN Co-Promoção 13736 - Myrtillus)	€158.393,00
NanoSKIN: Chemotherapeutic agent-loaded nanoparticles for innovative therapy of severe skin diseases – muco-/cutaneous Leishmaniasis and squamous cell carcinoma as examples. CITAB coordinator: Amélia Silva. Starting date: July 2010, duration: 24 months (ERA-Eula/0002/2009)	N/A
NaturAge - Anti-aging properties of natural compounds. CITAB coordinator: Cristóvão Lima. Starting date: May 2010, duration: 36 months (PTDC/QUI-BIQ/101392/2008). <a href="https://sites.google.com/site/naturageproject/home">https://sites.google.com/site/naturageproject/home</a>	€145.884,00
NutriDouro - Healthy crystallised fruits and jams with a traditional flavor. CITAB coordinator: Amélia Silva. Starting date: June 2010 duration: 36 months (QREN Co-Promoção 13111)	€476.838,00
OlivaTMAD - Thematic Networks of Information and Dissemination of Olive Cultivation Line of Trás-os-Montes and Alto Douro. CITAB coordinator: Eduardo	€241.791,00

Project name	CITAB Funding
Rosa. Starting date: January 2011, duration: 48 months (ProDer PA 14346)	
Physical exercise role on Human' lymphocyte DNA damage reduction: possible influence of oxidative stress and DNA repair capacity. CITAB coordinator: Amélia Silva. Starting date: 2012, duration: 36 months (PTDC/DES/121575/2010)	N/A
PromoAgro - Promotion of Agro-food Competitiveness. CITAB coordinator: Eduardo Rosa. Starting date: October 2010, duration: 36 months (NORTE - 07 - 0162 - FEDER - 000042)	€1.480.724,56
RAIDEN - Lightning activity in Portugal: variability patterns and socioeconomic impacts. CITAB coordinator: João Santos. Starting date: June 2009, duration: 42 months. (PTDC/CTE-ATM/101931/2008). <a href="http://raidem-project.ul.pt/">http://raidem-project.ul.pt/</a>	€72.356,00
SambucusFRESH - Improving productivity and quality in the production of elderberry in fresh, chilled and frozen. CITAB coordinator: Eunice Bacelar. Starting date: June 2012, duration: 36 months. Promoter: Regiefrutas (QREN Co-promoção 23109)	€248.242,96
Scots pine in Portugal: the "Southwest end" or just "the end"?. CITAB coordinator: Domingos Lopes. Starting date: January 2011, duration: 36 months (PTDC/AGR-CFL/110988/2009)	€181.781,00
SerCast- Reinforce of chestnut productivity in Sernancelhe municipality. CITAB coordinator: José Laranjo. Starting date: May 2012, duration: 36 months (Protocol with Sernancelhe Municipality)	€44.609,00
Trace gas emissions from Portuguese irrigated rice fields in contrasting soils, by the influence of crop management, climate and increase concentration of CO2 in the atmosphere. CITAB coordinator: Henrique Trindade. Starting date: March 2010, duration: 36 months (PTDC/AGR-AAM/102529/2008)	€45.360,00
Understanding Resistance to Pathogenic Fungi in Castanea sp. CITAB coordinator: José Laranjo. Starting date: February 2010, duration: 42 months. (ResCast).	€8.400,00
WUSSIAAME - Water use, survival strategies and impact of agrochemicals on water resources in agricultural Mediterranean ecosystems. CITAB coordinator: Aureliano Malheiro. Starting date: February 2012, duration: 36 months (PTDC/AAC-AMB/100635/2008)	€51.574,00

### 5.1.5.3 Publications in peer review Journals

During 2013 SAC research members published 70 SCI/JCR papers

- [1] Aires, A., Carvalho, R., Rosa, E.A.S. and Saavedra, M.J. (2013). Phytochemical characterization and antioxidant properties of organic baby-leaf watercress produced under organic production system. *CyTA - Journal of Food*. 11(4):343-351. <http://dx.doi.org/10.1080/19476337.2013.769025>
- [2] Aires, A., Dias, C.S.P, Rosa, E.A.S., and Saavedra, M.J.S. (2013). Antimicrobial Susceptibility of *Aeromonas* spp. Isolated from Pig Ileum Segments to Natural Isothiocyanates. *Medicinal Chemistry* 9:861-866. <http://eurekaselect.com/112966/article>
- [3] Aires, A., Marques, E., Carvalho, R., Rosa, E.A.S., and Saavedra, M.J. (2013). Evaluation of Biological Value and Appraisal of Polyphenols and Glucosinolates from Organic Baby-Leaf Salads as Antioxidants and Antimicrobials against Important Human Pathogenic Bacteria. *Molecules* 18:4651-4668. <http://www.mdpi.com/1420-3049/18/4/4651>
- [4] Andrade, C., Santos, J.A., Trigo, R.M., Corte-Real, J. (2013). Preface 2nd International Conference on Ecohydrology and Climate Change. *Nat. Hazards Earth Syst. Sci.* 13:1853-1856. <http://www.nat-hazards-earth-syst-sci.net/13/1853/2013/nhess-13-1853-2013.pdf>
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- [8] Boccaci, P., Aramini, M., Valentini, N., Bacchetta, L., Rovira, M., Drogoudi, P., Silva, A.P., Solar, A., Calizzano, F., Erdogan, V., Cristofori, V., Ciarmello, L.F., Contessa, C., Ferreira, J.J., Marra, F.P., and Botta. (2013). Molecular and morphological diversity of on-farm hazelnut (*Corylus avellana* L.) landraces from southern Europe and their role in the origin and diffusion of cultivated germplasm. *Tree Genetics & Genomes* 6(9):1465-1480. <http://link.springer.com/article/10.1007%2Fs11295-013-0651-7/fulltext.html>

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#### 5.1.5.4 Other International publications

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- [2] Andrade C, Santos J.A. (2013). Climate change projections for precipitation in Portugal. AIP Conference Proceedings, 1158, 829-832, doi: 10.1063/1.4825624.
- [3] Andrade C, Santos J.A., Fraga H. (2013). Precipitation Extremes in Portugal: an overview of climate change scenarios. 8th Symposium on Meteorology and Geophysics, the 14th Luso-Spanish Meeting on Meteorology, Associação Portuguesa de Meteorologia e Geofísica (APMG).
- [4] Carlos Correia, C. B., Anabela Fernandes-Silva, Eunice Bacelar, Berta Gonçalves, Helena Ferreira, José Moutinho-Pereira, Manuel A. Rodrigues. (2013). Green manure legumes affect seasonal soil and leaf CO<sub>2</sub> exchange rates in an olive rainfed orchard. Abstract book of the “XIII Congresso Luso-Espanhol de Fisiologia Vegetal”, 24-28 julho, Lisboa, Portugal, pp. 19. (<http://fisiologiavegetal2013.itqb.unl.pt/docs>)
- [5] Carneiro, J. P., Coutinho, J., & Trindade, H. (2013). N<sub>2</sub>O emissions from soil amended with cattle slurry under Mediterranean conditions (Mélynda Hassouna and Nadine Guingand, Ed.) (1er trimestre 2013 ed.). IFIP-Institut du Porc.
- [6] Cátia Brito, J.Moutinho-Pereira, Eunice A Bacelar, Berta Gonçalves, Helena Ferreira, Dario santos, Manuel A Rodrigues, Carlos Correia. (2013). Short and long-term

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- [7] Correia, C., Fernandes-Silva, A., Bacelar, E., Gonçalves, B., Ferreira, H., Moutinho-Pereira, J. A. Rodrigues, M.A (2013). Sustainable management of olive rainfed orchards by the introduction of leguminous cover crops. *Ecology & Safety*, 146-156.
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- [9] Dias, Maria C; Jesus, Cláudia; Pinto, Glória; Santos, Conceição; Gonçalves, Berta M; Gonçalves, Diana M; Malheiro, Aureliano; Correia, Carlos M; Moutinho-Pereira, José M. 2013. "The role of kaolin and bordeaux mixture in *Vitis vinifera* under water stress conditions: oxidative stress". 11th International POG Conference, Reactive Oxygen and Nitrogen Species in Plants, In *Biotechnologia* 94 (2): 170, Varsóvia.
- [10] Dinis Lia-Tânia, C.C., Rafael Pinheiro, Helder Fraga, Helena Ferreira, Eunice Bacelar, Berta Gonçalves, Fernando Alves, Jorge Costa, José Moutinho-Pereira. (2013). Physiological evaluation of kaolin applications in Touriga nacional growing under mediterranean climate (Douro Region). Abstract book of the "XIII Congresso Luso-Espanhol de Fisiologia Vegetal", 24-28 julho, Lisboa, Portugal, pp. 48. (<http://fisiologiavegetal2013.itqb.unl.pt/docs>)
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- [13] Esteves, R., Brito, D., Pinto, T., Costa, R., and Gomes-Laranjo, J. (2013). Genetic introgression program in ColUTAD. Ecophysiology versus ink disease resistance. In 2nd European Congress on Chestnut. Institute of Plant Protection of the University of Debrecen (Hungria), Institute of Forest Ecology of the S.A.S. in Zvolen, (Eslováquia) and Department of Horticulture and Food Science of the University of Craiova (Roménia). 9-13 October Debrecen, Hungria.
- [14] Eunice Bacelar, J. Moutinho-Pereira, Ermelinda Silva, Helena Ferreira, Berta Gonçalves, Carlos Correia. (2013). Does shade aggravate the stress imposed by

- drought in *Quercus suber* L.? Abstract book of the “XIII Congreso Luso-Espanhol de Fisiologia Vegetal”, 24-28 julho, Lisboa, Portugal, pp. 93. (<http://fisiologiavegetal2013.itqb.unl.pt/docs>)
- [15] Falco, V., Castro, I., Oliveira, A. A., Ferreira, V., Martin, J. P., Ortiz, J., et al. (2013). Characterization of related red-berried and white-berried grapevine cultivars. In International Symposium on Grapevine Physiology and Biotechnology, Chile.
- [16] Fraga, H.; Malheiro, AC; Moutinho-Pereira, J.; Santos, JA. 2013. "Maturity index for viticultural zoning: a case study for Iberia". In Proceedings of the 18th GiESCO International Symposium. 7th to 11th July, Porto.
- [17] Gabriel y Galán, J.M.; Pinto, T.; Cuevas, F.B.; Fernández, P.; Anjos, M.R. (2013). Biometría del aparato estomático en espécies ibéricas de helechos: algunas apreciaciones ecomorfológicas. XIX Simposio Botánica Criptogámica, Universidad de las Palmas de Gran Canaria, 24-28 June. Las Palmas de Gran Canaria. 1:56.
- [18] Gonçalves, B., Gonçalves, D., Malheiro, A., Santos, D., Bacelar, E., Ferreira, H., Correia, C., Moutinho-Pereira, J. (2013). Role of salicylic acid in grapevine resistance to water stress. Abstract book of the “XIII Congreso Luso-Espanhol de Fisiologia Vegetal”, 24-28 julho, Lisboa, Portugal, pp. 13. (<http://fisiologiavegetal2013.itqb.unl.pt/docs>)
- [19] Goufo, P., Oliveira, M. B. P. P., Kratz, S., Ferreira, L. M. M., Carranca, C., Rosa, E. A. S., et al. (2013). Climate change reduces the contents of nutrients and antioxidants in rice. Book of Abstracts, First International Global Food Security Conference, Noordwijkerhout, the Netherlands. pp. 4-4.
- [20] José Moutinho-Pereira, D. G., Helder Fraga, Eunice Bacelar, Lia-Tânia Dinis, Helena Ferreira, Aureliano Malheiro, Berta Gonçalves, Carlos Correia. (2013). Water stress monitoring in potted Touriga Nacional grapevines using JIP-test. Abstract book of the “XIII Congreso Luso-Espanhol de Fisiologia Vegetal”, 24-28 julho, Lisboa, Portugal, pp. 56. (<http://fisiologiavegetal2013.itqb.unl.pt/docs>)
- [21] Mota, M., Pinto, T., Marques, T., Borges, A., Raimundo, F., Martins, A., Veiga, V., Caço, J., and Gomes-Laranjo, J. (2013). Watering chestnut orchards in northeast of Portugal. In IInd European Congress on Chestnut. Institute of Plant Protection of the University of Debrecen (Hungria), Institute of Forest Ecology of the S.A.S. in Zvolen, (Eslováquia) e Department of Horticulture and Food Science of the University of Craiova (Roménia). 9-13 Outubro. Debrecen. Hungria.
- [22] Rodrigues A.S., Jesus Simal-Gandara, & Domingos Almeida (2013). Flavonoids in portuguese onion landraces from Póvoa de Varzim: interannual variations-P0144-VII Congreso Ibérico de Agroingeniería y Ciencias Hortícolas, ETSIA y EUITA, Universidad Politécnica de Madrid, Espanha, 26 al 29 de agosto de 2013 (poster and short oral presentation session).



### 5.1.5.5 Book Chapters

- [1] Andreani, T., Silva, A.M., and Souto, E.B. (2013). Cell scaffolds and fabrication technologies for tissue engineering. In “Advanced Functional Polymers and Composites: Materials, Devices and Allied Applications”, Ed. By Inamuddin, Nova Science Publishers, Inc., N.Y., USA Vol. 1, Cap. 7, pp. 212-232. ISBN: 978-1-62948-055-8.
- [2] Martins, L.M., Moura, J. P., Cardoso, J.V., Anjos, M.R., Oliveira, P., Arnaldo, P. S., and Pinto. T. (2014). Implementação de uma Rede de Avisos para Promoção da Qualidade da Castanha. Projeto AlertCast – Vale Inovação, UTAD, Vila Real, 100 pp.

### 5.1.5.6 Books

N/A

### 5.1.5.7 Completed Master and Ph.D. thesis

During 2013 the SAC research members supervised 18 MSc and 8 PhD theses

#### MSc Theses:

- [1] MSc: Ana Luísa da Silva Alves. Induction of premature senescence in human fibroblasts through endoplasmic reticulum stress: protection by phenolic diterpenes. Tese de mestrado em Bioquímica Aplicada, Departamento de Biologia, Escola de Ciências, Universidade do Minho, October 2013. Supervisor: Cristóvão F. Lima; co-supervisor: Cristina Pereira-Wilson (CITAB-UM).
- [2] MSc: Bento, V.A. (2013). Improving shelf-life and overall quality of melons, Master Thesis in Biotechnology and Food Quality, UTAD, 2013. Supervisor: Ana Barros (CITAB-UTAD).
- [3] MSc: Campos, A. (2013). Comportamento fenológico de *Vitis vinifera* L. face à variabilidade climática na região de Lisboa. 2nd cycle in Environmental Engineering/Engenharia do Ambiente of the UTAD. Supervisor: J. A. Santos and A. Malheiro (CITAB-UTAD).
- [4] MSc: Cordeiro, M. (2013). Extremos da precipitação e impactes no balanço energético em Portugal. Master in Environmental Engineering/Engenharia do Ambiente of UTAD. Supervisor: J. A. Santos and M.L R. Liberato (CITAB-UTAD)
- [5] MSc: Correia, R.M.T. (2013). Contributo para a Análise do Ensino de Biologia e Geologia no 3º Ciclo do Ensino Básico e no Ensino Secundário – Reflexão Pessoal”. Master in Biology and Geology of UTAD. Supervisor: Maria do Rosário Anjos (CITAB-UTAD).
- [6] MSc: Fagundes, S.I.G. (2013). Corantes escurilícos com potencial aplicação na terapia fotodinâmica do cancro. Mestrado em Bioquímica, Universidade de Trás-os-Montes e Alto Douro, Vila Real. Supervisor: Lucinda Vaz dos Reis (UTAD) and Amélia M. Lopes Dias da Silva (CITAB-UTAD).



- [7] MSc: Freitas, E.S.S. (2013). Estudo do efeito antibacteriano de extractos de agrião-de-água (*Nasturtium officinale* R. Br.) e de isotiocianatos em isolados de origem animal e humana. Master in Biologia Clínica Laboratorial, UTAD. Supervisor: Maria José Felix Saavedra (UTAD) and Alfredo Aires (CITAB-UTAD).
- [8] MSc: Pereira, J. G. (2013). Anticancer potential of the triterpenic fraction of eucalyptus bark extracts in colorectal cancer cells. Master in Biotecnologia e Bioemprededorismo de Plantas Aromáticas e Medicinais, Department of Biology, School of Sciences, University of Minho. Supervisor: Cristóvão F. Lima; co-supervisor: Cristina Pereira-Wilson (CITAB-UM)
- [9] MSc: Laode, F.C. (2013). Elaboração de atividades/conteúdos para o ensino da eletricidade 3º ciclo. Master in Formação de Formadores do INFORDEPE (Timor-Leste). Supervisor: Alberto Dias (CITAB-UM)
- [10] MSc: Lopes, C.S.R. (2013). Impacte do ozono troposférico no Parque Natural do Alvão: estudo do efeito fitotóxico e de marcadores genéticos em plantas sensíveis e tolerantes de *Nicotiana tabacum*. Mestrado em Tecnologias Ambientais. Universidade de Trás-os-Montes e Alto Douro. Supervisor: Ana Lúcia Pinto-Sintra (CITAB-UTAD) and João Cardoso Vilhena (Universidade Atlântica).
- [11] MSc: Loureiro, B.R.R. (2013). Bioatividade de extrato de folhas de *Corema album* L. em *Drosophila melanogaster*: um estudo de genotoxicidade e stresse oxidativo. Master in Biologia Clínica e Laboratorial, UTAD. Supervisor: Isabel Gaivão (UTAD) and Francisco Peixoto (CITAB-UTAD).
- [12] MSc: Machado, M. (2013). FTIR spectroscopy for the differentiation of olive oils (cv. Cobrançosa) in two ripening stages, Master Thesis in Biotechnology and Food Quality, UTAD. Supervisor: Ana Isabel Barros (CITAB-UTAD) and José Manuel Almeida.
- [13] MSc: Nogueira, L. (2013). Composição química e actividade antioxidante de diferentes variedades de pimento (*Capsicum annum* L.). Master in Biotecnologia e Qualidade Alimentar, Instituto Politécnico de Bragança. Supervisor: Alfredo Aires (CITAB-UTAD); co-supervisor: José Alberto Pereira (CIMO-IPB).
- [14] MSc: Pereira, H.R.C. (2013). Genotoxic, phytotoxic and protective effects of Portuguese propolis. Master in Biologia Molecular, Biotecnologia e Bioemprededorismo em Plantas, University of Minho. Co-Supervisors: Ana Cunha, Rui Oliveira and Cristina Aguiar (CITAB-UM).
- [15] MSc: Pires, J.M.P. (2013). Contributo para a caracterização da medula óssea da Cabra (*Capra aegagrus hircus*) por citometria de fluxo. Master in Biotecnologia para as Ciências da Saúde, UTAD. Supervisor: Amélia M. Silva and Maria Isabel Dias (CITAB-UTAD).
- [16] MSc: Rodrigues, L.P.C. (2013). Protein oxidation and circadian rhythmicity: Identification of specific protein targets. Master in Bioquímica, UTAD. Supervisor: Bertrand Friguet (Université Pierre et Marie Curie- Paris VI) and Francisco Peixoto (CITAB-UTAD).

- [17] MSc: Silva, I.G. (2013). Estabelecimento de uma metodologia de cultura *in vitro* visando a limpeza de infecções virais de material clonal de populações de *Allium sativum* L. Master in Biologia Molecular, Biotecnologia e Bioempreendedorismo em Plantas, University of Minho. Co- Supervisor: Ana Cunha (CITAB-UM) and Aida Reis (INIAV).
- [18] MSc: Teixeira, A. (2013). Effect of Grapevine genotype and environment on grape berry composition. Master in Biologia Molecular, Biotecnologia e Bioempreendedorismo em Plantas (CITAB-UM). Supervisor: Hernâni Gerós (CITAB-UM) and José Eiras Dias (INIAV; Dois-Portos).

#### **Ph.D. Theses:**

- [1] PhD: Conde, A.J.S. (2013). Role of mannitol in the defense of *Olea europaea* and *Vitis vinifera* against drought and salinity. Universidade do Minho/Instituto Superior de Agronomia. Supervisor: Hernâni Gerós (CITAB-UM); co-supervisor: Manuela Chaves, ISA/ITQB.
- [2] PhD: Fraga, M.G. (2013) - ISOPM: Framework para a gestão de projetos de outsourcing de sistemas de informação. PhD in Informática, UTAD. Supervisors: João Varejão (UTAD) e Paula Cristina Oliveira (CITAB-UTAD).
- [3] PhD: Neves da Silva, J. (2013). Physicochemical Characterization of DNA/DODAB: MO Cationic Liposome Complexes and Study of their Potential as Nonviral Vectors. Co- Supervisor: Olga Coutinho, (CITAB-UM), P Coutinho and ER Oliveira.
- [4] PhD: Silva, P. (2013). Estudos bioquímicos e moleculares sobre a tolerância ao sal em *Populus euphratica* Oliv. Supervisor: Hernâni Gerós (CITAB-UM); co-supervisor: Rui Tavares.
- [5] PhD: Sousa, J. (2013). Dynamical aspects of thunderstorms in Portugal and climate change scenarios, UTAD. PhD in Ciências Físicas, UTAD. Supervisors: J. A. Santos (CITAB-UTAD) and M. Fragoso (Universidade de Lisboa).
- [6] PhD: Venâncio, C.A.S. (2013). Effects of Ketamine administration in rats: mitochondrial and functional changes in brain and liver. PhD in Ciências Veterinárias - Ciências Biomédicas, UTAD. Supervisor: Teresa Summavielle (IBMC-MC), Luis Antunes (CITAB-UTAD) and Francisco Peixoto (CITAB-UTAD).
- [7] PhD: Yunlei Zhang (2013). Study of the mechanisms underlying the cytotoxic effects of bovine lactoferrin on breast cancer cells. PhD thesis in Biomedical Engineering, Department of Biological Engineering, University of Minho, October 2013. Supervisor: Lígia Rodrigues (DEB-UM); Co-supervisor: Cristóvão F. Lima (CITAB-UM).
- [8] PhD: Nunes, L.C.S. (2013). Growth and productivity of mixed species in forest stands in Northern Portugal. PhD in Ciências Agronómicas e Florestais, UTAD. Supervisor: Domingos Lopes (CITAB-UTAD), Co-supervisor: Francisco Castro Rego (ISA)

### 5.1.5.8 Patents/propotypes

- [1] Silva E., Bacelar E., Sampaio A. Aplicação de extratos de Sumagre como agente antimicrobiano. Provisional Application for National Patent N.º 106 708.

### 5.1.5.9 Organization of conferences

Conferences and related activities organized by SAC members:

- [1] "Análise SWOT do Ensino Superior Português: Oportunidades, Desafios e Estratégias de Qualidade" GT2-CS11, IPQ, 13 Novembro, IPAM, Porto. Ana Sofia Rodrigues.
- [2] "Douro: Clima e Solo" Palestra inserida no Ciclo de Conferências DAgró/CITAB. 30 de Outubro 2013. UTAD. Ana Alexandra Ribeiro Coutinho de Oliveira.
- [3] "Maximização dos Serviços Ecosistema Vinha" Palestra inserida no Ciclo de Conferências DAgró/CITAB. 13-14 Novembro 2013. UTAD. Ana Alexandra Ribeiro Coutinho de Oliveira.
- [4] 1<sup>st</sup> Meteorological Day Meeting, Polytechnic Institute of Tomar, April 03, 2013. Cristina Maria Mendes Andrade.
- [5] 62<sup>nd</sup> International Congress and Annual Meeting of the Society for Medicinal Plant and Natural Product Research (GA), que terá lugar no Campus de Azurém da Universidade do Minho, Guimarães (Portugal) de 31 agosto a 4 setembro 2014. Organização (UM): Coordenador: Alberto Dias (CITAB-UM), Comissão organizadora: Ana Cunha e vários outros elementos do grupo AgroBioPlant do CITAB-UM e do CBMA. Ana Cristina Gomes da Cunha.
- [6] 7<sup>a</sup> Biojornadas da UTAD. 1-23 Novembro de 2013. Comissão Organizadora: Dario L Santos, Ana Sampaio, Amélia M Silva; José Laranjo, Maria José Saavedra, Ana Coimbra. Comissão Científica: A. Fontainhas-Fernandes, João Cabral, Maria José Saavedra, Carlos Correia, Albino Dias, Amélia Silva, Ana Sampaio, Ana Coimbra, António Crespi, Artur Sá, Dario Santos, Eunice Luís Vieira Areal Bacelar, José Laranjo, Sandra Monteiro.
- [7] 8th Symposium on Meteorology and Geophysics, the 14th Luso-Spanish Meeting on Meteorology", Associação Portuguesa de Meteorologia e Geofísica (APMG), Ericeira, Portugal. João Carlos Andrade dos Santos.
- [8] International Workshop "New developments on lightning research in Portugal", University of Lisbon, Portugal. João Carlos Andrade dos Santos.
- [9] PAM fluorometry: a tool for the in vivo study of productivity and stress in plants and algae, no âmbito das Advanced Techniques of the BioPlant Doctoral Programme (Programa Inter-universitário de Doutoramento MAP) e dos Advanced Workshop Studies in Biology and Applied Sciences. Universidade de Aveiro, 1-5 Julho 2013. Com vários oradores e 14 participantes. Co-organização Ana Cunha (UM) e João Serôdio (CESAM, UA). Ana Cristina Gomes da Cunha.

- [10] Seminário Boas Práticas no Cultivo de Arroz Por Alagamento, em Portugal, Instituto Nacional de Investigação Agrária e Veterinária, I.P. (INIAV), Anfiteatro do INIAV, Quinta do Marquês, Oeiras, Portugal, 30 de Maio de 2013. Comissão Científica. José Luís da Silva Pereira.
- [11] Seminário em Biotecnologia Vegetal (no âmbito do M3BP): *Ginkgo biloba* and protection against DNA damage. Departamento de Biologia, UM, Braga, 1 fevereiro de 2013. Com 9 participantes. Orador: Prof. Dr. Rui Oliveira (CBMA-UM). Ana Cristina Gomes da Cunha.
- [12] Seminário em Biotecnologia Vegetal (no âmbito do M3BP): Pharmacological and toxicological assays for the investigation of biological properties of plant extracts/compounds. Departamento de Biologia, UM, Braga, 1 de fevereiro de 2013. Com 9 participantes. Orador: Dr Cristovão Lima (CITAB-UM). Ana Cristina Gomes da Cunha.
- [13] Seminário em Biotecnologia Vegetal (no âmbito do M3BP): Stable transformation of Lettuce: Towards therapeutic protein production. Departamento de Biologia, UM, Braga, 25 de janeiro de 2013. Com 9 participantes. Orador: Dr. Joana Silvestre (UM). Ana Cristina Gomes da Cunha.
- [14] International Training Course entitled Gaseous emissions from animal manure and biowastes – processes and measurement was an MSc and PhD course organized by University of Trás-os-Montes e Alto Douro (UTAD). Course was integrated in the Marie Curie International Initial Training Network project “ReUseWaste-Recovery and Use of Nutrients, Energy and Organic Matter from Animal Waste”. From 25th to 30th November 2013. Coordinator: Henrique Trindade.

#### 5.1.5.10 Industry contract research

N/A

#### 5.1.5.11 Internationalization

The effort of SAC researchers in their internationalization resulted in the following different types of international activities:

- [1] Aires, A. (2013). 2<sup>nd</sup> International Conference of "WASTES: Solutions, Treatments and Opportunities, September 11th-13th, 2013, Braga, Portugal,
- [2] Alcoforado, M. J., Fragoso, M., and Santos, J.A. (2013). Historical Climatology in Portugal: first-year outcomes from Klimhist Project. In European Meteorological Society Annual Meeting (EMS2013), 13, Reading, UK. EMS Annual Meeting Abstracts, 10, EMS2013-35
- [3] Andrade, C., and Santos, J. A. (2013). A statistical and dynamical analysis of some Winter and Summer temperature extremes in Europe. In European Geosciences Union General Assembly, 38, Vienna, Austria. Geophysical Research Abstracts, 15, EGU2013-4413.

- [4] Andrade, C., and Santos, J. A. (2013). Climate change projections for precipitation in Portugal. In International Conference of Numerical Analysis and Applied Mathematics (ICNAAM 2013), 11, Rhodes, Greece. AIP Conference Proceedings, American Institute of Physics, 1558, 829-832 ([doi: 10.1063/1.4825624](https://doi.org/10.1063/1.4825624)). ISBN: 978-0-7354-1091-6.
- [5] Andrade, C.M.M. (2013). 12<sup>th</sup> International Conference of Numerical Analysis and Applied Mathematics, ICNAAM 2013, 22-28 September, Greece.
- [6] Andrade, C.M.M. (2013). 8<sup>th</sup> Symposium on Meteorology and Geophysics, the 14<sup>th</sup> Luso-Spanish Meeting on Meteorology, Associação Portuguesa de Meteorologia e Geofísica (APMG), 18-20 March 2013, Portugal.
- [7] Andrade, C.M.M. (2013). Invited Editor of a Special Issue of the Natural Hazards and Earth System Sciences.
- [8] Andrade, C.M.M. (2013). European Geosciences Union, General Assembly 2013, 07-12 April 2013, Austria.
- [9] Antunes, L.M. (2013). 12<sup>th</sup> FELASA and 12<sup>th</sup> SECAL joint congress: "Animal Research: Better Science from Fewer Animals", 10-13 June, Barcelona, Spain.
- [10] Antunes, L.M. (2013). Euroanaesthesia 2013 Congress, 1-4 June 2013.
- [11] Antunes, L.M. (2013). SEB Main Meeting, 3-6 July, Valencia, Spain.
- [12] Associate Editor of "BMC, Complementary & Alternative Medicine". Manuel Fernandes Ferreira.
- [13] Breia, R., Ramalho, F., Serôdio, J., Gerós, H., and Cunha, A. (2013). Photosynthetic performance of grape cells under abiotic stress. XIII Congresso Luso-Espanhol de Fisiologia Vegetal, Faculdade de Ciências da Universidade de Lisboa, 24-28 July 2013, Lisboa, Portugal
- [14] Breia, R., Vieira, S., Silva, J.M., Gerós, H. and Cunha, A. (2013). Mapping of photosynthetic activity in the grape berry by chlorophyll fluorescence imaging. XIII Congresso Luso-Espanhol de Fisiologia Vegetal, July 2013, ITQB - Oeiras, Portugal.
- [15] Carneiro, M. F., Liberato, M. L. R., and Santos, J.A. (2013). To what extent power production in Portugal is driven by precipitation? In European Meteorological Society Annual Meeting (EMS2013), 13, Reading, UK. EMS Annual Meeting Abstracts, 10, EMS2013-95-1.
- [16] Carqueijeiro, I., Noronha, H., Duarte, P., Gerós, H., and Sottomayor, M. (2013). Vacuolar transport of the medicinal alkaloids from *catharanthus roseus* is mediated by a proton driven antiport. XIII Congresso Luso-Espanhol de Fisiologia Vegetal, July 2013, ITQB - Oeiras, Portugal.
- [17] Conde, A., Regalado, A., Rodrigues, D., Chaves, M.M., and Gerós, H. (2013). Modifications in the metabolism of polyols in *vitis vinifera* during water deficit. 2013. XIII Congresso Luso-Espanhol de Fisiologia Vegetal, July 2013, ITQB - Oeiras, Portugal.

- [18] Fangueiro, J.F; Souto, E.B.; Silva, A.M.; Egea, M.A.; Calpena, A.C. & García M.L.. Amélia M. L. Dias da Silva. (2013). Transdermal permeation studies of epigallocatechin gallate loaded into lipid nanoparticles". 13th annual meeting: SKIN FORUM. London, UK.
- [19] Ferreira, F.M.L. (2013). International seminar in Brno (Chec Republic) June 2013 pelo período de uma semana, tendo efetuado 2 seminários sobre plantas aromáticas e medicinais e reforçado as relações institucionais com o Departamento de Ciências Agrárias da Brno Mendel University.
- [20] Ferreira, M.F. (2013). Member of Editorial Board of Chemistry: An Indian Journal (Phytochemistry Section).
- [21] Ferreira, M.F. (2013). Member of the Evaluation Panel of the Programa Nacional de Biotecnologia (Rep. Colômbia). Establecimiento de la cadena de abastecimiento de Petiveria alliacea y Caesalpinia spinosa en condiciones de comercio equitativo para la producción de un fitomedicamento antitumoral conforme a las normas de Buenas Prácticas de Agricultura y Colecta (BPAC) y Buenas Prácticas de Manufactura (BPM). [http://www.colciencias.gov.co/programa\\_estrategia/programa-nacional-de-biotecnolog-0](http://www.colciencias.gov.co/programa_estrategia/programa-nacional-de-biotecnolog-0)
- [22] Ferreira, M.F. (2013). Member of the GP-TCM Research Association (Good Practice in Traditional Chinese Medicine Research Association). <http://www.gp-tcm.org/>
- [23] Fraga, H., Karremann, M.K., Malheiro, A.C., Moutinho-Pereira, J., Pinto, J.G., and Santos, J.A. (2013). Future projections for European viticulture and associated uncertainties. In European Meteorological Society Annual Meeting (EMS2013), 13, Reading, UK. EMS Annual Meeting Abstracts, 10, EMS2013-437.
- [24] Fraga, H., Malheiro, A. C., Moutinho-Pereira, J., Pinto, J. G., and Santos, J.A. (2013). Uncertainties in climate change projections for viticulture in Portugal. In European Geosciences Union General Assembly, 38, Vienna, Austria. Geophysical Research Abstracts, 15, EGU2013-2067-1.
- [25] Fraga, H., Moutinho-Pereira, J., Malheiro, A.C., and Santos, J.A. (2013). Categorized composite index for viticultural zoning: a case study for Iberia. In International Symposium GiESCO 2013 (Group of international Experts of vitivinicultural Systems for Co-Operation), 18, Porto, Portugal. Ciencia e Tecnica Vitivinicola, 28, 324-328. ISSN: 0254-0223.
- [26] Fragoso, M., Alcoforado, M. J., and Santos, J.A. (2013). KLIMHIST: A Project on Historical Climatology in Portugal. In European Geosciences Union General Assembly, 38, Vienna, Austria. Geophysical Research Abstracts, 15, EGU2013-7842
- [27] Fragoso, M., Leite, S., Sousa, J., Correia, S., Reis, M., Santos, J. A. (2013). An overview of the RAIDEN project: a study of lightning in Portugal. In European Geosciences Union General Assembly, 38, Vienna, Austria. Geophysical Research Abstracts, 15, EGU2013-11409

- [28] Freitas, A., Prieto, B., Cunha, A. (2013). *In vitro* multiplication of *Centranthus ruber*, *Phagnalon saxatile* and *Umbilicus rupestris* species with potential for the phytoremediation of tailings of different metal ore mine. 8th International Symposium on In Vitro Culture & Horticultural Breeding, Coimbra, 2-7 June 2013 (Comunicação oral).
- [29] Gabriel y Galán, J.M., Pinto, T., Cuevas, F.B., Fernández, P., and Anjos, M.R. (2013). Biometría del aparato estomático en espécies ibéricas de helechos: algunas apreciaciones ecomorfológicas. XIX Simposio Botánica Criptogámica, Universidad de las Palmas de Gran Canaria, 24-28 Junio. Las Palmas de Gran Canaria. 1:56.
- [30] Gerós, H. (2013). Solute transport and plant response to abiotic stress. (2013). LPP-Erasmus Programme Individual Teaching Programme for Teaching Staff Mobility, May, 2003, Université Catholique de Louvain,
- [31] Gerós, H. (2013). Bilateral Cooperation Portugal-Tunisia "Copper uptake and detoxification in grapevine". Gerós, H. (CITAB-UM)) and Hanana Mohsen (Centro de Biotecnologia Borj-Cedria BP 901, Hammam-Lif 2050 Tunísia 2013-2014.
- [32] Gerós, H. (2013). Biomembrane transport. LPP-Erasmus Programme Individual Teaching Programme for Teaching Staff Mobility, May, 2013, Université Catholique de Louvain.
- [33] Gerós, H. (2013). Marco Polo Project "Effect of sustainable post-veraison management practices on sugar and anthocyanin content in grapes from Sangiovese and Uva Longanesi" University of Minho (Hernâni Gerós) and University of Bologna (Adamo Domenico Rombolà). Paola Tessarin. 2013-2014
- [34] Gomes-Laranjo, J., Raimundo, F., Ferreira-Cardoso, J., Portela, E., Pinto, T., Anjos, R., Marques, G., Oliveira P., Moura, J.P., Arnaldo, P., Martins, L., and Matos, S. (2013). Sercast- learning the producers from Sernancelhe's council how to increase the chestnut productivity. IIInd European Congress on Chestnut. Institute of Plant Protection of the University of Debrecen (Hungria), Institute of Forest Ecology of the S.A.S. in Zvolen, (Eslováquia) e Department of Horticulture and Food Science of the University of Craiova (Roménia). 9-13 Outubro. Debrecen. Hungria.
- [35] Lima, CF. (2013). Indução de defesas antioxidantes intracelulares como mecanismo de protecção de extractos de plantas medicinais. 2º BioProspectar - Sustentabilidade na Geração de Serviços e Processos no Centro-Oeste, Instituto Federal Goiano, Campus de Rio Verde, Rio Verde (Brazil), August 13-15, 2013. Cristóvão Fernando Macedo Lima.
- [36] LLP/Erasmus, na Scuola di Dottorato in Scienze della Natura e Tecnologie Innovativa, Università degli Studi Di Torino, Turim, Itália. Ana Lúcia Rebocho Lopes Pinto e Sintra.
- [37] Malheiro, A C., Campos, R., Fraga, H., Eiras-Dias, J., Silvestre, J., and Santos, J.A. (2013). Temperature influence on grapevine phenology in the Lisbon winemaking

- region. In European Meteorological Society Annual Meeting (EMS2013), 13, Reading, UK. EMS Annual Meeting Abstracts, 10, EMS2013-341.
- [38] Malheiro, A.C. (2013). ERASMUS-Bolsa de Mobilidade Docente, foi bolseiro na 'CAH Vilentum University of Applied Sciences', Dronten, Holanda.
- [39] Malheiro, A.C., Campos, R., Fraga, H., Eiras-Dias, J., Silvestre, J., and Santos, J.A. (2013). Relationships between temperature variability and phenological timing of grapevines in the Lisboa wine region. In International Symposium GiESCO 2013 (Group of international Experts of vitivinicultural Systems for Co-Operation), 18, Porto, Portugal. *Ciencia e Tecnica Vitivinicola*, 28, 832-835. ISSN: 0254-0223.
- [40] Martins, V., Bassil, E., Teixeira, A., Blumwald, E., and Gerós H. (2013). Functional characterization of *vitis vinifera* copper transporter 1 (VvCTR1). XIII Congresso Luso-Espanhol de Fisiologia Vegetal, July 2013, ITQB - Oeiras, Portugal.
- [41] Martins, V., Bassil, E., Teixeira, A., Blumwald, E., and Gerós, H. (2013). Copper transporter and grape berry metabolism in response to Bordeaux mixture. Annual Conference of Cost Action 1106-QualityFruit. September 2013, Crete, Greece.
- [42] Melo-Gonçalves, P., Rocha, A., Pinto, J. G., and Santos, J.A. (2013). High-resolution climate projections for precipitation extremes in Iberia from a multi-model ensemble and its uncertainties. In European Meteorological Society Annual Meeting (EMS2013), 13, Reading, UK. EMS Annual Meeting Abstracts, 10, EMS2013-154.
- [43] Melo-Gonçalves, P., Rocha, A., Pinto, J.; Santos, J.A., and Corte-Real, J. (2013). Non-parametric inferences on climate change of high-resolution spatial patterns of precipitation extremes in Iberia. In European Geosciences Union General Assembly, 38, Vienna, Austria. *Geophysical Research Abstracts*, 15, EGU2013-13153.
- [44] Nobre, I., and Sintra A.L. P. (2013). Indução de embriogénese somática em anteras e gineceus de *Vitis vinifera* L. cv. Cabernet Sauvignon: efeito do agente polimerizador. XIX Congresso Brasileiro de Floricultura e Plantas Ornamentais & VI Congresso Brasileiro de Cultura de Tecidos de Plantas, Painel 107, Recife, 21 a 25 de Outubro de 2013, Brasil. Ana Lúcia Rebocho Lopes Pinto e Sintra.
- [45] Noronha, H., Delrot, S., and Gerós, H. (2013). Starch metabolism in the grape berry. XIII Congresso Luso-Espanhol de Fisiologia Vegetal, July 2013, ITQB - Oeiras, Portugal.
- [46] Noronha, H., Martins, A.P., Soveral, G., Chaumont, F. and Gerós, H. (2013). Cloning, expression, localization and functional studies of a grape intracellular aquaporin. XIII Congresso Luso-Espanhol de Fisiologia Vegetal, July 2013, ITQB - Oeiras, Portugal.
- [47] Pinto, T.M.S. (2013). ERASMUS-Bolsa de Mobilidade Docente (STA), foi bolseira na Università degli Studi della Tuscia, no Department of Florestry, Agricultural, Nature and Energy Sciences and technologies (DAFNE),



- [48] Rodrigues, A.S. (2013). International Seminar: Evaluación de la Calidad de la Investigación y de la Educación Superior, Granada, España.
- [49] Rodrigues, A.S. (2013). 7<sup>th</sup> Iberian Congress of Agroingeniería y Ciencias Hortícolas ETSIA y EUITA, Universidad Politécnica de Madrid.
- [50] Rodrigues, AS. (2013). Quality Assurance in Catalonia and Spain training activity: This first activity is addressed to analyse the framework of Quality Assurance for Higher Education in Catalonia and Spain and how AQU Catalunya is operating in it. This training is devoted to the Academic staff assessment and the Internal Quality Assurance at the agency and to wrap up the conclusions of training activities performed before.
- [51] Rodrigues, T., Rocha, A., Melo-Gonçalves, P., Pinto, J. G., and Santos, J. A. (2013). Cyclonic activity and its relation to Weather Regimes in the North Atlantic European region: Present and future climates. In European Meteorological Society Annual Meeting (EMS2013), 13, Reading, UK. EMS Annual Meeting Abstracts, 10, EMS2013-660-1.
- [52] Santos, C.I.R. (2013). Symposium for European Freshwater Sciences: Biomarkers and Bio-indicators: combining the best of two worlds in river quality assessment. Symposium for European Freshwater Sciences, Munster, Germany.
- [53] Santos, J. A., Fraga, H., Jones, G. V., and Pinto, J. G. (2013). Future scenarios for wine production in the Douro (Portugal). In International Symposium GiESCO 2013 (Group of international Experts of vitivinicultural Systems for Co-Operation), 18, Porto, Portugal. Ciencia e Tecnica Vitivinicola, 28, 315-318. ISSN: 0254-0223.
- [54] Santos, J.A., Reis, M.A., Pablo, F., Rivas, L., and Leite, S.M. (2013). Regionalization of cloud-to-ground lightning in Iberia. In European Conference on Severe Storms, 7, Helsinki, Finland. Book of abstract.
- [55] Santos, J.A., Woollings, T., and Pinto, J.G. (2013). The extreme opposite behaviour of the North Atlantic flow in the 2010 and 2012 winters. In European Meteorological Society Annual Meeting (EMS2013), 13, Reading, UK. EMS Annual Meeting Abstracts, 10, EMS2013-109-1.
- [56] Sintra, A.L.R.L.P. (2013). Collaboration of Ana Lúcia Rebocho Lopes Pinto e Sintra with Tissue Culture and Transformation Laboratory, Department of Biology and Genomic of Fruit Plants at Edmund Mach Foundation, Instituto Agrario di San Michele all'Adige (IASMA).
- [57] Sousa, J. F., Santos, J.A., and Fragoso, M. (2013). Modeling of cloud-to-ground lightning activity in Portugal. In European Conference on Severe Storms, 7, Helsinki, Finland. Book of abstracts.
- [58] Sousa, J., Fragoso, M., and Santos, J.A. (2013). Diagnosis of an episode with severe thunderstorms in Portugal. In European Meteorological Society Annual Meeting (EMS2013), 13, Reading, UK. EMS Annual Meeting Abstracts, 10, EMS2013-100.

- [59] Teixeira, A., Araújo, D., Noronha, H., Eiras Dias, J., and Gerós, H. (2013). Lipoxygenase activity in grape berry. XIII Congresso Luso-Espanhol de Fisiologia Vegetal, July 2013, ITQB - Oeiras, Portugal.

#### 5.1.5.12 Other publications National

- [1] Andrade, C., Santos, J. A., Fraga, H.. 2013. "Precipitation extremes in Portugal: overview of climate change scenarios". In Livro de resumos do 8º Simpósio de Meteorologia e Geofísica da APMG, 18-20 Março 2013., Ericeira.
- [2] Andrade, C., Santos, J.A. (2013) Winter and Summer temperature extremes in Europe: A statistical and dynamical analysis. 1st Meteoday Meeting Abstracts Book, Vol. 1, pg1.
- [3] Andrade, C., Santos, J.A., and Fraga, H. (2013). Precipitation extremes in Portugal: overview of climate change scenarios. In Symposium on Meteorology and Geophysics of the APMG, 8, Ericeira, Portugal. Book of abstracts
- [4] Breia, R., Ramalho, F., Serôdio, J. Gerós, H., and Cunha, A. (2013). Photomixotrophic grape berry cell suspensions: a suitable cell model for the study of abiotic stresses in fruit photosynthesis 4º Workshop Anual Bioplant, 18-19 July, Universidade do Porto, Porto, Portugal.
- [5] Breia, R., Vieira, S., Silva, J., Gerós, H., and Cunha, A. (2013). Photosynthesis in grape berry tissues: an in vivo approach by imaging PAM fluorometry. 4º Workshop Anual Bioplant, 18-19 July, Universidade do Porto, Porto, Portugal.
- [6] Brito, D., Esteves, R., Pinto, T., Costa R., and Gomes-Laranjo, J. (2013). Estudo Ecofisiológico em Castanheiros Híbridos. In Livro de Resumos das 7as Biojornadas, UTAD, Vila Real, 20-22 novembro. 1:22.
- [7] Carneiro, J.P., Coutinho, J., and Trindade, H. (2013). Emissões de carbono do solo decorrentes da utilização agrícola de resíduos orgânicos (Eduardo Anselmo Castro e Ana Paula Gomes Teresa Fidélis Luís Arroja A. I. M. Carlos Borrego, Ed.) (Vol. II). Aveiro: Departamento de Ambiente e Ordenamento – Universidade de Aveiro.
- [8] Carqueijeiro, I., Noronha, H., Duarte, P., Gerós, H., and Sottomayor, M. (2013). Vacuolar transport of the medicinal alkaloids from *Catharanthus roseus* is mediated by a proton driven antiport 4º Workshop Annual Bioplant, 18-19 July, Universidade do Porto, Porto, Portugal.
- [9] Conde, A., Regalado, A., Rodrigues, D., Chaves, M.M., and Gerós, H. (2013). Polyol transport and metabolism adjustments in *Vitis vinifera* in response to water stress. 4º Workshop Anual Bioplant, 18-19 July, Universidade do Porto, Porto, Portugal.
- [10] Esteves, R., Brito, D., Pinto, T., and Gomes-Laranjo, J. (2013). Introgressão de genes em castanheiro para obtenção de porta-enxertos resistentes." In Livro de Resumos das 7as BioJornadas, UTAD, Vila Real, 20-22 novembro. 1:23.
- [11] Figueiredo, N., Carranca, C., Coutinho, J., Trindade, H., Pereira, J., Marques, P., et al. (2013). A climate change scenario and soil ammonium "fixation" during the

- seasonal rice (*Oryza sativa*) growth in Portugal under intermittent flooding. *Revista de Ciências Agrárias*, 455-465.
- [12] Figueiredo, N., Menino, R., Prazeres, A., Fareleira, P., Vargues, A., Carranca, C., Marques, P., Pereira, J., Goufo, P., Trindade, H., Carneiro, J., Couto, N., Mateus, E., Ribeiro, A., & Coutinho, J. (2013). O cultivo do arroz em Portugal e a resposta do agrossistema às alterações ambientais de temperatura e concentração de dióxido de carbono. *Vida Rural*, 28-31.
- [13] Fraga, H., Malheiro, A., Moutinho-Pereira, J., and Santos, J.A. (2013). Ensemble projections for viticultural zoning in Europe: Portugal as a case study. In *Symposium on Meteorology and Geophysics of the APMG*, 8, Ericeira, Portugal. Book of abstracts
- [14] Fraga, H., Santos, J.A., Malheiro, A.C., Moutinho-Pereira, J. (2013). Projeções climáticas para zonagem vitícola em Portugal". *Meteoday 2013*, In Livro de resumos do 1º Encontro do Dia Mundial da Meteorologia. 3 Abril, Tomar.
- [15] Fraga, H., Malheiro, A., Moutinho-Pereira, J., and Oliveira, A.A. (2013). "As condições climáticas das principais castas em Portugal: o presente e o futuro". *Enovitis, Revista Técnica de Viticultura e Enologia*, nº 34.
- [16] Fragoso, M., Santos, J.A., Reis, M. A., Sousa, J.F., Leite, S.M., Correia, S., and Janeira, M. (2013). An overview on cloud-to-ground lightning activity in Portugal over the 2003-2009 period. In *Workshop "New developments on lightning research in Portugal"*, 1, Lisbon, Portugal. Book of Abstracts, 10. ISBN: 978-972-636-237-1.
- [17] Gerós, H (2013). Purification and functional characterization of the grapevine aquaporin VvSIP1. 2013. 4º Workshop Anual Bioplant, 18-19 July, Universidade do Porto, Porto, Portugal.
- [18] Gerós, H. (2013). Membrane transport and plant-environment interactions. ANTÓNIO V. XAVIER SEMINARS. March 14. 2013. ITQB. Oeiras, Portugal.
- [19] Gomes, M. E., Gabriel, R., Santos, J. A., Alencão, A, Sousa, L., Moreira, H., Cabecinha, E., Mendonça, S., Martins, L. (2013). The International Douro Cliffs – contributions to a sustainable development of rural tourism in a Portugal-Spain cross-border area. In *International Conference on Rural Tourism (ORTE 2013)*, 1, University of Aveiro, Portugal. ORTE Proceedings, 1, 333-345. ISBN: 978-989-20-4016-5.
- [20] Gomes, M., Santos J. A., Alencão, A., Sousa, L, Pereira, A., Moreira, H., Cabecinha, E., and Gabriel, R. (2013). Importance of geological mapping in the landscape interpretation of waterfalls and the Poço de Los Humos and Faia da Água Alta (International Douro) and its importance for climatic changes. In *Conferência Anual do Grupo de Geologia Estrutural e Tectónica / Sociedade Geológica de Portugal (9GGET)*, 9, Estremoz, Portugal. Book of Abstracts
- [21] Hughes, S.J., Cabecinha, E., Santos, J., Leite, S., Aranha, J., Lopes, D., Cabral, J., Santos, M., Trindade, H., Cortes, R. V. M. (2013). Modelling climate and land use change on the ecological and physicochemical quality of reservoirs in northern

- Portugal. In Congresso Ibérico de Gestão e Planeamento da Água (8CIGPA), 8, Lisbon, Portugal. Book of Abstracts
- [22] Lopes, D.M., Casaroli, D., Bolina, G., Nunes, J.N., and Martins, T. (2013). Quantificação da melhoria microclimática em arruamentos florestados com *Pinus caribea*, na cidade de Goiânia, Brasil: O caso de estudo da Avenida Ricardo Paranhos. 7º Congresso Florestal Nacional, Vila Real/Bragança, Portugal, 5 a 8 de Junho
- [23] Lopes, D.M., Sette Jr, C.R., França, Y. and Cardoso, D. (2013). Comparação da capacidade de fixação de carbono, por povoamentos de Pinus, entre o Norte de Portugal e a região Centro Oeste do Brasil. 7º Congresso Florestal Nacional, Vila Real/Bragança, Portugal, 5 a 8 de Junho.
- [24] Martins, V., Teixeira, A., Bassil, E., Blumwald, E., and Gerós, H. (2013). Copper transporters in grapevine. 2013. 4º Workshop Annual Bioplant, 18-19 July, Universidade do Porto, Porto, Portugal.
- [25] Melo-Gonçalves, P., Rocha, A., Carvalho, M.J., Pinto, J., Santos, J.A., and Corte-Real, J. (2013). Weather Regimes and Precipitation Extremes forecasting in Iberia. In Symposium on Meteorology and Geophysics of the APMG, 8, Ericeira, Portugal. Book of abstracts
- [26] Melo-Gonçalves, P., Rocha, A., Carvalho, M.J., Pinto, J.G., Santos, J. A., Corte-Real, J. (2013). "Weather Regimes and Precipitation Extremes forecasting in Iberia", Trabalho apresentado em Symposium on Meteorology and Geophysics of the APMG, In Book of Abstracts, Ericeira, Portugal.
- [27] Oliveira, M., Castro, C., Correia, M.J., Costa, R., and Oliveira, A.A. (2013). Sap Flow and Variation on stem Diameter to Determine the WineGrape Water Status". In 9º Simposio de Vitivinicultura do Alentejo, Évora.
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**5.1.5.13 Government/Organization contract research**

N/A

**5.1.5.14 Awards**

N/A

## 5.1.6 Future research

### 5.1.6.1 Objectives

#### Project #05 – Agronomy, climate change and environmental studies

**Task 5.01 Climate variability and environmental impacts:** This task aims at assessing relationships between short-term climate variability (on a yearly basis) & crop parameters (. For this purpose, downscaling strategies & crop models are applied, which will ultimately help assessing the impacts of climate variability on crops. Climate change impact on crops (from decades to centuries) is also a major concern. Particular attention is devoted to the winemaking sector, helping to outline suitable adaptation measures for mitigating detrimental climate change impacts on the sector. Viticultural zoning, integrating climate, soil & water on very high spatial resolutions (< 1 km), is also a major goal. Paleoclimatic reconstructions for Portugal, using documentary & proxy sources, as well as paleoclimatic simulations, are also an important line of research within this task, providing a better understanding of the mechanisms underlying climate variability & its extremes.

**Task 5.02 Biodiversity as a potential sustainable development resource: Selection, characterization and conservation of plant resources:** Study traditional cultural practices for the implementation of integrated agriculture plan at a low environmental impact. Characterise the selected germplasm of some fruit species of temperate climate, with special attention to nutritional & nutraceutical aspects, & organoleptic properties. Increase the understanding about growing, processing, marketing, distribution, consumption trends in the agro-food industry & valorisation of local products with beneficial effects on the related market. Select & characterize blueberry cultivars best adapted to the soil and climate of northern Portugal.

**Task 5.03 Environmental stress. Improving cropping practices and mitigation measures:** Assess environmental stresses, namely related with climate change, on economically important crops in Mediterranean agro-ecosystems, by using an integrative approach from molecular, cellular, biochemical & physiological levels to whole plant growth. Specific tasks will include: Amelioration of physiological responses of *Vitis vinifera* L. & *Olea europaea* L. using reflective antitranspirants; Improvement of physiological activity & productivity of rainfed olive orchards by leguminous cover crops. Morpho-physiological characterization of Portuguese varieties of *Sambucus nigra* L. & their responses to abiotic stress.**Task 5.04 Nutrient cycles, soil and residues management:** Assess chemical & biological treatment methods to reduce ammonia & GHG emissions from stored animal slurries & after their application to arable soils. Assess gas fluxes from Mediterranean maquis ecosystems under different N-deposition regimes & global climate changing scenarios. Investigate the effects of soil amendment with composts rich in phytochemical compounds on organic N & C mineralization kinetics & greenhouse gases emissions. Evaluate N, P & C nutrient cycling effects, carbon sequestration & greenhouse gases emissions from soils under different soil management practices in vineyards & legume–cereal rotations.

## Project #06 – Plant products and co-products (3P's)

**Task 6.01 Food composition and health effects:** Investigate the main components of the water & ethanolic extracts and essential oils obtained from *Thymus vulgaris* L., *Thymus mastichina* L., *Geranium robertianum* L. & *Boletus edulis* Bull. Investigate the antioxidant properties of these extracts & their potential role in modulating several biological mechanisms by using *in vitro* assays in selected cell lines. Obtain information on the anti-proliferative effect of various salads leaf extracts by using two different cell lines.

**Task 6.02 Added value products derived from agro-food wastes:** Differentiate the biological role of different vegetables, aromatic & medicinal plants as natural source of bioactive compounds with antioxidant & antimicrobial activities & development of new food-products. Evaluate the potential of co-products development from agro-food wastes residues with biological added value; Anti-cancer & anti-inflammatory activities; Identification of quorum-sensing inhibitors & formation of biofilms including studies of synergism/potentiating effects with sanitizers & antibacterial & antibiotic agents. Develop new extraction methods for compounds with biological added value. Implement new analytical procedures for evaluation of biological role of different compounds. Develop patents for new bioactive compounds extractions procedure.

**Task 6.03 MAP Biotechnology & bioactivities:** Study of solute (sugars/acids/phenolics) transport/metabolism in grapevine & grape berry photosynthesis, under the effect of heat & drought. Evaluate MAP & natural compounds bioactivities. Study the effect of plant polyphenols on intestinal glucose transporters, insulin secretion from  $\beta$ -cells, mechanisms of colon anti-cancer effects. Study the use of biomass residues/plant extracts/natural compounds for obtaining functional foods, application on dermocosmetics, & nanoencapsulation aiming pharmacological applications. Evaluate different plant bed substrates for domestic wastewater treatment & study of rhizosphere biocenoses. Study plant interaction with host pathogens.

**Task 6.04 Grapevine cultivation technologies and physiology:** The metabolome of grapes from three Portuguese cultivars grown in two DOC regions will be elucidated during 2014. Also, we aim to address the role of polyol metabolism in grapevine defense against drought.

## 5.2 Ecointegrity

### 5.2.1 Group description

Principal Researcher	Mário Gabriel Santiago dos Santos
Research area	Environment
Home Institution	Universidade de Trás-os-Montes e Alto Douro

### 5.2.2 Funding

	2011	2012	2013
FCT Projects	227.859,00€	347.873,00€	431.761,83€
Other (National)	739.246,97 €	747.159,20€	195.524,67€
Other (International)	0,00 €	0,00€	6.250,00€
Industry (National)	337.923,98 €	198.814,96€	364.418,00€
Industry (International)	0,00 €	0,00€	0,00€
<b>Total</b>	<b>1.305.029,95 €</b>	<b>1.293.847,16€</b>	<b>997.954,82€</b>

### 5.2.3 Objectives

Research in this group focuses on ecosystem characterization (natural or changed by human activities) at different scales of observation. Results are used to select appropriate ecological indicators or ecosystem processes that allow modelling the different components, dynamics and to set guidelines for ecosystem management and restoration, namely the conservation of natural resources, biodiversity and the restoration of disturbed areas or target species. EI research is grouped into two main projects:



### **Project #03 - Biodiversity, Environmental Assessment and Biotechnology**

Researchers working in tasks within this project study the effects of large scale environmental change on the sustainability, resilience and diversity of disturbed natural ecosystems and agro-systems. Research aims include:

- ☺ the creation of appropriate tools for capturing, characterising and predicting the spatial and temporal dynamics, structure and function of terrestrial and aquatic ecosystems affected by human disturbance;
- ☺ The development and implementation of typologically appropriate management plans, based on the ecological assessment of different components of the environment, in order to rehabilitate or restore degraded systems.
- ☺ Bioremediation of systems affected by anthropogenic disturbance.
- ☺ Conservation of threatened species of terrestrial and aquatic ecosystems

### **Project #04 – Disturbance of forest and agro-forested ecosystems**

This project includes studies on abiotic and biotic disturbance that act on forests, woodlands, agricultural agro-forestry systems. Research aims:

- ☺ To characterize spatial and temporal patterns of abiotic disturbance regimes and to develop management guidelines for disturbance mitigation and adaptation measures.
- ☺ The ecology of endangered arthropods and their role in the functioning of ecosystems.
- ☺ Integration of ecosystem services in agriculture to decrease the use of pesticides and associated costs.

#### **5.2.4 Main achievements**

A summary of EI main achievements is listed below

- ☺ Development of integrative ecological assessment tool for aquatic ecosystems, by combining environmental bioindicators and biomarkers to detect the multiple stressors in aquatic systems.
- ☺ Validation of biomarkers for contamination assessment of fish and new applications on macroinvertebrate species to assess toxic effects of heavy metals and effect of endocrine disrupting compounds in developmental and reproductive parameters of fish. Osmoregulatory and apoptotic responses were tested to assess heavy metals toxicity, and endocrine disrupting compounds effects in fish development and reproductive parameters were evaluated.

- ⑤ Linking monitoring was successfully linked with practical river restoration initiatives
- ⑤ Integrating Multi-Model Inference statistical analysis, Stochastic-Dynamic Modelling and Geographic Information Systems to develop a unique and novel spatially explicit modelling framework, designated by the acronym StDM (Stochastic Dynamic Methodology), which predicts ecological indicators responses to realistic scenarios of environmental changes.
- ⑤ Thermo chemical characterization of biomass from different types of wood and forest wastes contributing to the bioremediation of these refractory materials and agro-food wastes using autochthonous bacteria, yeasts and filamentous fungi in the biodegradation of recalcitrant molecules.
- ⑤ Contribution to decrease the environmental impact of diverse agro-forest industry effluents: Optimal immobilization procedure of environmental yeast isolates for application in the dephenolization of industry wastewaters; best extraction process, from olive mill wastewaters as a waste valorization process. These studies have a clear on inland waters which generally cause high oxygen deficits
- ⑤ Forest fire behaviour and ecology studies at European level to predict and prevent wildfire events, and modelling of climate change effects in forest and agro-forest systems
- ⑤ GIS on forestry biomass and burning areas location. New allometric models for biomass estimation of trees and for shrubs to create maps on biomass consumed by wild fires and biomass recovery.
- ⑤ Use of digital cameras on board on DRONS or UAV (Unmanned Aerial Vehicle) for local aerial photography acquisition over agricultural and forested areas for use in vine yard stratification and for trees classification and biomass estimation
- ⑤ Study of randomness in flora and vegetation by analysis of morpho-genetic and environmental correlations, and by floristic-structural characterization of vegetation. Development of randomness approach as a tool to describe continuity on floristic evolution and phylobiogeographic and conservation management of flora and vegetation in the western Mediterranean basin.
- ⑤ Identification of several *Maculinea* populations at the Alvão Natural Park. Genetic characterization of host plant and the butterfly with international research partners.
- ⑤ Identification and assessment of potential ecological infrastructures already existing on vineyard agro-ecosystem for habitat management strategy to maximize the ecosystem services provided in vineyards.
- ⑤ Biological control of the European Grapevine Moth (EGVM), *Lobesia botrana*.
- ⑤ Study of the use of endemic plants to provide ecosystem services such as aesthetic values and conservation of biodiversity.

- 🌿 Landscape analysis mapping to create maps that provide landscape-level information to identify practices that conserve or enhance biological diversity in and around vineyards.

### 5.2.4.1 Mobility

Hélder Filipe dos Santos Viana went on a Short-Term Scientific Mission “Assessment of forest biomass for energy in Mediterranean ecosystems” as part of the COST Action FP0902 “Development and harmonisation of new operational research and assessment procedures for sustainable forest biomass supply” at the Universidad de Castilla-La Mancha, Albacete, Spain.

FCT Project “Apoptose no ovário de peixe-zebra (*Danio rerio*): caracterização das vias de sinalização, papel na diferenciação sexual e efeito de disruptores endócrinos” Coordinator Ana Maria Monteiro Paiva Coimbra attended a progress meeting at the Universidade Complutense de Madrid, Spain.

## 5.2.5 Group productivity

### 5.2.5.1 International Projects

EU researchers participated in 1 international project during 2013

Project Name	Funding
Forest fires under climate, social and economical changes in Europe, the Mediterranean and other fire-affected areas of the world (FUME). CITAB Coordinator: Mário G. Pereira. Starting Date: January 2010, duration 48 months (FP7-ENV-243888-2009). <a href="http://www.fumeproject.eu/">http://www.fumeproject.eu/</a>	25.000 €

### 5.2.5.2 National Projects

EU researchers participated in 19 national projects during 2013:

Project Name	Funding
Zebrafish ( <i>Danio rerio</i> ) anaesthesia and potential implications in research – reduction, replacement and refining. CITAB Coordinator: Mariza Monteiro. Starting Date: July 2013, duration 24 months (PTDC/CVT-WEL/4672/2012)	159.965€
Conbi - Biodiversity and Conservation Bivalves - ecogeographic information, genetic and physiological. CITAB Coordinator: Simone Varandas. Starting Date: 2011, duration: 36 months (PTDC/AAC-AMB/117688/2010)	15.000 €
Cryptococcus <i>gattii</i> environmental survey: Europe and Mediterranean area. CITAB Coordinator: Ana Sampaio. Starting Date: 2013, duration: 36 months (ISHAM Cryptococcus working group).	N/A

Project Name	Funding
Economountain, Economy of biodiversity in the Vila Pouca de Aguiar mountains. CITAB Coordinator: Aurora Capapé. Starting Date: July 2012, duration: 36 months. (Fundo EDP Biodiversidade)	50.000 €
ENAC - Evolution of North Atlantic Climate; the role of Blocking and Storm-tracks in the Past, Present and Future climate of Southern Europe (CITAB Coordinator: Mário G. Pereira. Starting Date: January 2010, duration: 36 months. (PTDC/AAC-CLI/103567/2008).	135.445 €
FIRE-ENGINE - Flexible Design of Forest Fire Management Systems. CITAB Coordinator: Paulo Fernandes. (MIT/FSE/0064/2009). Starting date: 2011. Duration: 36 months. <a href="http://feup.azul.net/fe/">http://feup.azul.net/fe/</a>	30.935€
FIREGLOBULUS - Prescribed fire use in blue gum plantations. CITAB Coordinator: Paulo Fernandes. (nº 2011/021555). QREN - I&D em Co-promoção. Starting date: 2011. Duration: 36 months.	189.427 €
FLAIR - Fire – Land – Atmosphere Inter-Relationships: understanding the processes to predict wildfire regimes in Portugal. CITAB Coordinator: Mário G. Pereira. Starting Date: January 2010, duration: 36 months (PDC/AAC-AMB/104702/2008).	21.240 €
Com(s)Ciência Ambiental. CITAB Coordinator: Sandra Mariza Monteiro. Starting date: 2013, duration: 6 months. Ciência Viva, Agência Nacional para a Cultura Científica e Tecnológica; Referência (PEC120)	4.998€
ForeStake - The role of local stakeholders to the success of forest policy in areas affected by fire in Portugal. CITAB Coordinator: Paulo Fernandes. Starting date: April 2010, duration: 36 months (PTDC/AGR-CFL/099970/2008)	43.668€
Increasing functional biodiversity in olive groves to enhance conservation biological control of insect pests. CITAB Coordinator: Laura Torres. Starting Date: April 2010, duration: 36 months (PTDC/AGR-AAM/100979/2008)	107.800 €
IND_CHANGE - INDicator-based modelling tools to predict landscape CHANGE and to improve the application of social-ecological research in adaptive land management. CITAB Coordinator: João Cabral. Starting Date: July 2013. Duration: 36 months (PTDC/AAG-MAA/4539/2012)	14.629 €
EcoVitis - Maximizing Eco-services into Douro Demarcated Region vineyards. CITAB Coordinator: Laura Torres. Starting Date: January 2011, duration: 36 months. Promotor: Real Companhia Velha (Proder Cooperação para a Inovação)	495.122 €
Ovary apoptosis in zebrafish (Danio rerio): pathways characterization, role in sexual differentiation and as endocrine disruptors. CITAB Coordinator: Ana Coimbra. Starting Date: June 2010; duration: 36 months (PTDC/CVT/102453/2008).	137.516 €
PISCIS. Desenvolvimento de uma barreira comportamental para peixes. CITAB Coordinator: Rui Cortes. Starting Date: January 2010, duration: 36 months (ADI & Original Consulting).	43.428 €
Promotion and valuation of native forest species. CITAB Coordinator: João Carvalho. Starting date: June 2013, duration: 36 months. (Associação Nacional Conservação Natureza – QUERCUS)	N/A

Project Name	Funding
River systems Biomonitoring: an integrated approach. CITAB Coordinator: Rui Cortes. Starting Date: January 2011, duration: 36 months (PTDC/BIA-ECS/114859/2009)	183.000 €
Science in Sinthony. CITAB Coordinator: Carla Amaral Marinho. Starting Date: March 2011, duration: 24 months (Ciência Viva).	157.700 €
Study of the chironomid communities of the high altitude lakes of Central Portugal and Northern Spain. Coordinator: Samantha Jane Hughes	N/A

### 5.2.5.3 Publications in peer review Journals

El Researchers published a total of 39 articles in SCI/JCR journals in 2013:

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- [2] Anacleto, J., Pereira, M.G. and Ferreira, J.M. (2013). Reply to 'Comment on "On the Clausius equality and inequality"'. *European Journal of Physics*. 34 L17–L21. [10.1088/0143-0807/34/1/L17](http://dx.doi.org/10.1088/0143-0807/34/1/L17)
- [3] Azevedo, J.C., Possacos, A., Aguiar, C.F., Amado, A., Miguel, L., Dias, R., Loureiro, C. and Fernandes, P.M. (2013). The role of holm oak edges in the control of disturbance and conservation of plant diversity in fire-prone landscapes. *Forest Ecology and Management*. 297 37-48. <http://www.sciencedirect.com/science/article/pii/S0378112713001011>
- [4] Bastos R, Santos M and Cabral J A (2013). A new stochastic dynamic tool to improve the accuracy of mortality estimates for bats killed at wind farms. *Ecological Indicators*. 34 428-440. <http://www.sciencedirect.com/science/article/pii/S1470160X13002343>
- [5] Bezerra, R.M.F., Fraga, I. and Dias, A. A. (2013). Utilization of integrated Michaelis-Menten equations for enzyme inhibition diagnosis and determination of kinetic constants using Solver supplement of Microsoft Office Excel. *Computer Methods and Programs in Biomedicine*. 109(1) 26-31. <http://www.sciencedirect.com/science/article/pii/S0169260712002143>
- [6] Carlos C., Gonçalves F., Sousa S., Salvação J., Sharma L., Soares R., Manso J., Nóbrega M., Lopes A., Soares S., Aranha J., Villemant C., Marques G. and Torres L. (2013). Environmentally safe strategies to control the European Grapevine Moth, *Lobesia botrana* (Den. & Schiff.) in the Douro Demarcated Region. *Ciência e Técnica Vitivinícola*. 1006-1011. <http://www.advid.pt/imagens/artigos/13736242012647.pdf>
- [7] Carvalho D., Horta P., Raposeira H., Santos M., Luís A. and Cabral J.A. (2013). How do hydrological and climatic conditions influence the diversity and behavioural trends of water birds in small Mediterranean reservoirs? A

- community-level modelling approach. *Ecological Modelling*. 257 80-87.  
<http://www.sciencedirect.com/science/article/pii/S0304380013000963>
- [8] Catry, F.X., Pausas, J.G., Moreira, F., Fernandes, P.M. and Rego, F. (2013). Post-fire response variability in Mediterranean Basin tree species in Portugal. *International Journal of Wildland Fire*. 22 (7) 919-932.  
<http://www.publish.csiro.au/?paper=WF12215>
- [9] Cortes, R.M.V., Hughes, S.J., Pereira, V. and Varandas, S. (2013). Tools for bioindicator assessment in rivers: The importance of spatial scale, land use patterns and biotic integration. *Ecological Indicators*. 34 460-477.  
<http://www.sciencedirect.com/science/article/pii/S1470160X13002355>
- [10] Crespi A.L., Ferreira M., Fonseca T., Marques C. P. (2013). Structural and floristic behaviors in East Timor forest vegetation. *Ecological Research* (2013) 28: 1081–1090.  
[http://download.springer.com/static/pdf/718/art%253A10.1007%252Fs11284-013-1089-y.pdf?auth66=1408720140\\_ae6db83f63c10398858dda4683de2f74&ext=.pdf](http://download.springer.com/static/pdf/718/art%253A10.1007%252Fs11284-013-1089-y.pdf?auth66=1408720140_ae6db83f63c10398858dda4683de2f74&ext=.pdf)
- [11] Douda K., Lopes-Lima M., Hinzmann M., Machado J., Varandas S., Teixeira A. and Sousa R. (2013). Maladaptive use of aliens as a threat to native affiliate. *Diversity and Distributions*. 19 (8) 933–942.  
<http://onlinelibrary.wiley.com/doi/10.1111/ddi.12044/abstract>
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- [13] Fernandes, P.M. (2013). Fire-smart management of forest landscapes in the Mediterranean basin under global change. *Landscape and Urban Planning*. 110 175-182. <http://www.sciencedirect.com/science/article/pii/S0169204612002952>
- [14] Fernandes, P.M., Davies, G.M., Ascoli, D., Fernández, C., Moreira, F., Rigolot, E., Stoof, K., Vega, J.A. and Molina, D. (2013). Prescribed burning in southern Europe: developing fire management in a dynamic landscape. *Frontiers in Ecology and the Environment*. 11(Online Issue 1) e4-e14.  
<http://www.esajournals.org/doi/full/10.1890/120298>
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- [17] Fidalgo, M.L., Ferreira, C. and Sampaio, A. (2013). Assessment of the preferences of red swamp crayfish (*Procambarus clarkii*) fed with riparian tree

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- [18] Fraga, C.M, Sanches Fernandes, L.F., Pacheco, F.A.L., Reis, C and Moura, JP. (2013). Exploratory Assessment of Groundwater Vulnerability to Pollution in the Sordo River Basin, Northeast of Portugal. *Revista Escola de Minas*. 66 (1) 49-58. [http://www.scielo.br/scielo.php?script=sci\\_arttext&pid=S0370-44672013000100007](http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0370-44672013000100007)
- [19] Freitas, L., Pereira, M.G., Caramelo, L., Mendes, M. and Nunes, L.F. (2013). Homogeneity of monthly air temperature in Portugal with HOMER and MASH. *Idojaras, Quarterly Journal of the Hungarian Meteorological Service*. 117(1) 69-90. [http://library.wmo.int/opac/index.php?lvl=notice\\_display&id=1048](http://library.wmo.int/opac/index.php?lvl=notice_display&id=1048)
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- [28] Pereira M.G., Calado T., Dacamara C., Calheiros T. (2013). Effects of regional climate change on rural fires in Portugal. *Climate Research*, Vol. 57: 187–200.  
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- [29] Pereira, S., Pinto, A.L., Cortes, R., Fontainhas-Fernandes, A., Coimbra, A.M. and Monteiro, S.M. (2013). Gill histopathological and oxidative stress evaluation in native fish captured in Portuguese northwestern rivers. *Ecotoxicology and Environmental Safety*. 90 157-166.  
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- [30] Pinheiro L., Torres L.M., Raimundo J. and Santos S.A.P. (2013). Effect of seven species of the family Asteraceae on longevity and nutrient levels of *Episyrphus balteatus*. *BioControl*. 58 797–806.  
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#### 5.2.5.4 Other publications International

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- [3] Calheiros, T., Pereira, M.G., Pinto, J.G. and DaCamara, C. (2013). Assessing potential changes in fire weather in Europe. *Geophysical Research Abstracts*. 14 EGU2013-14059. <http://meetingorganizer.copernicus.org/EGU2013/EGU2013-14059.pdf>
- [4] Calheiros, T., Pereira, M.G., Pinto, J.P. and DaCamara, C. (2013). Potential effects of regional climate change on rural fires in Europe. *APMG2013, 8ª Simpósio de Meteorologia e Geofísica da APMG, 14º Encontro Luso-Espanhol de Meteorologia*. [http://www.apmg.pt/index.php?option=com\\_content&task=blog\\_category&id=24&Itemid=2](http://www.apmg.pt/index.php?option=com_content&task=blog_category&id=24&Itemid=2)

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- [15] Hughes, S.J., Cabecinha, E., Santos, J., Leite, S., Aranha, J., Lopes, D., Cabral, J. A., Santos, M., Trindade, H., Cortes, R.V.M. (2013). Modelling climate and land use change on the ecological and physicochemical quality of reservoirs in northern Portugal. *VIII Congresso Ibérico de Gestão e Planeamento da Água*. <http://www.ersar.pt/website/ViewContent.aspx?Section=Consumidores&SubFolderPath=&FinalPath=Eventos&FolderPath=&GenericContentId=1082>
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- [18] Monzón, A. and Santos, A. & Carneiro, C. (2013). Infraestructuras para la biodiversidad en ecosistemas vitivinícolas: Región Demarcada del Duero (Portugal). *VIII Simposium Internacional de Fauna Salvaje. Libro de resúmenes*. 166. Zamora. <http://www.simpodiumwaves.es/>
- [19] Pereira, M.G., Calheiros, T., Pinto, J.G. and Caramelo L. (2013). Assessing potential changes of weather-related risk on chestnut productivity. *Geophysical Research Abstracts*. 14 EGU2013-13325. <http://meetingorganizer.copernicus.org/EGU2013/EGU2013-13325.pdf>
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### 5.2.5.5 Book Chapters

- [1] Cabecinha, E., Cabral, J. and Hughes, S.J. (2013). An outline of modelling tool applications in freshwater ecosystem and resource management. In *Horizons in Earth Science Research*. Benjamin Veress and Jozsi Szigethy (Ed). Nova Science Publishers, Inc. USA. ISBN: 978-1-62257-954-9. Volume: 9. 77-104. [https://www.novapublishers.com/catalog/product\\_info.php?cPath=23\\_29&products\\_id=37515](https://www.novapublishers.com/catalog/product_info.php?cPath=23_29&products_id=37515)
- [2] Fernandes, P.M. (2013). Forest fuel management for fire mitigation under climate change. In *Forest Management of Mediterranean Forest Under the New*

- Context of Climate Change: Building Alternatives for the Coming Future*. Lucas-Borja, M.E. (Ed). Nova Science Publishers. 31-41. <https://www.novapublishers.com/catalog/index.php>
- [3] Paula Seixas Arnaldo, Maria da Conceição Rodrigues, Teresa Fidalgo Fonseca. (2013). Europe's threatened species: The case of the endangered Maculinea butterflies (Lepidoptera, Lycaenidae). In: *Endangered Species: Habitat, Protection and Ecological Significance*. Nova Science Publishers. ISBN:978-1-62257-548-0. 143:153. <https://www.novapublishers.com/catalog/index.php>
- [4] Pinheiro L.A., Torres L.M. and Santos S.A.P. (2013). *Sirfídeos associados ao olival transmontano. Importância da vegetação herbácea espontânea na sua vitalidade*. Instituto Politécnico de Bragança, Bragança, ISBN: 978-972-745-156-2, 36 pp.

### 5.2.5.6 Books

- [1] Marta-Costa, A.A., Pinto, R., Manso, F.T., Tibério, M.L., Carneiro, I., Fernandes, P., Botelho, H. 2013. *Participação pública e gestão florestal na Serra de Montemuro: Entre a percepção e a realidade*. Sodivir – Edições do Norte, Lda. Vila Real. ISBN: 978-972-8546-43-4.
- [2] Torres L., Aranha J., Salvação J., Martins A., Raimundo F., Gonçalves F., Carlos C., Sousa S., Crespí A.L., Monzón A., Marques G., Gomes C., Travassos P., Barros P., Carvalho D., Santos M. and Cabral J.A. (2013). *Maximização dos serviços do ecossistema vinha. Guia de Campo à Quinta das Carvalhas*. Martins, M.; Torres, L. and Crespí, A. (Ed). Minfo, Vila Real. ISBN:978-989-97969-2-8.
- [3] Torres L. and Goncalves F. (2013). *A protecção contra pragas em olivicultura biológica*. UTAD. (Proj.Olivatmad). ISBN:978-989-704-112-9.

### 5.2.5.7 Completed Master and Ph.D. theses

A total of 18 MSc theses were completed under the supervision of EI researchers in 2013.

- [1] MSc: Fernandes, A. (2013). Fogo controlado em matos no NW de Portugal: determinação de valores de prescrição e caracterização do comportamento do fogo. Master in Engenharia Florestal, UTAD. Supervisor: Paulo M. Fernandes (CITAB-UTAD).
- [2] MSc: Pinto, J. (2013). Análise do perímetro de incêndios florestais no distrito de Vila Real. Master in Engenharia do Ambiente, UTAD. Supervisor: Paulo M. Fernandes (CITAB-UTAD).
- [3] MSc: Queirós, R. J. Silva (2013). Aplicação de Detecção remota e Sistemas de Informação Geográfica na determinação do índice de área foliar em

- povoamentos de pinheiro bravo. Master in Gestão Ambiental e Ordenamento do Território, Escola Superior Agrária de Ponte de Lima, Instituto Politécnico de Viana do Castelo. Supervisor: Helder Viana (ESA-IPV/CITAB) and Joaquim Mamede Alonso (ESAPL).
- [4] MSc: Brito, A.F. (2013). Estudo da situação do corço no sítio Alvão-Marão nos limites de Vila Real. Master in Engenharia Zootécnica, UTAD. Supervisor: Aurora Monzón Capapé (CITAB-UTAD).
- [5] MSc: Cajaiba, R.L. (2013). Utilização de uma metodologia estocástico-dinâmica para simular a resposta de Coleoptera cavernícolas a gradientes ambientais e de perturbação antropogénica. Master in Engenharia do Ambiente, UTAD. Supervisors: Mário Santos and João Alexandre Cabral (CITAB-UTAD).
- [6] MSc: Carvalho, V. (2013). Gestão de Resíduos em Estaleiros de Construção. Master in Engenharia Civil, UTAD. Supervisor: Cristina Reis and Luís Filipe Sanches Fernandes (CITAB-UTAD).
- [7] MSc: Costa, R.J.N. (2013). Contribuição para o estudo do regime de fogo em Portugal. Master in Clima e Alterações climáticas, UTAD. Supervisor: Mário Gonzalez Pereira and Liliana Caramelo (CITAB-UTAD).
- [8] MSc: Ferreira, D.M. (2013). Modelação baseada em agentes para simulação do uso do espaço e efeitos causados pela instalação de um parque eólico sobre *Nyctalus leisleri*. Master in Engenharia do Ambiente, UTAD. Supervisor: Mário Santos and João Alexandre Cabral (CITAB-UTAD).
- [9] MSc: Freixo, C.S.M. (2013). Aplicação de um modelo baseado em agentes (ABM) para avaliação do impacto ecológico de parques eólicos em populações reprodutoras de *Alauda arvensis*: um caso de estudo. Master in Engenharia do Ambiente, UTAD. Supervisor: Mário Santos and João Alexandre Cabral (CITAB-UTAD)
- [10] MSc: Macário, E.M.B. (2013). Impacto de alterações climáticas no dimensionamento de tubagens e órgãos de recolha de águas pluviais prediais. Master in Engenharia Civil, UTAD. Supervisor: Luís Filipe Sanches Fernandes and Mário Gonzalez Pereira (CITAB-UTAD).
- [11] MSc: Matos, H.T.P. (2013). Detecção de Ligações Clandestinas à Rede de Saneamento. Mestrado em Engenharia Electrotécnica e de Computadores, Universidade de Trás-os-Montes e Alto Douro. Supervisor: Pedro Mestre and Luís Filipe Sanches Fernandes (CITAB-UTAD).
- [12] MSc: Patrício, C.I.M. (2013). Contribution to the study of bio-ecology of freshwater mussels (Unionoida) Northeast of Portugal. MSc in Management of Forest Resources, UTAD. 74 pp. Supervision: Prof. Amílcar Teixeira ESA - IPB and Simone Varandas (CITAB-UTAD).
- [13] MSc: Santos, S.L. (2013). Avaliação da toxicidade do cobre na indução de morte celular programada em diferentes linhas celulares. Master in Biologia Clínica Laboratorial, UTAD. Supervisor: Sandra Mariza Monteiro (CITAB-UTAD) and Ana Rita Álvaro.

- [14] MSc: Santos, D.C. (2013). Disrupção endócrina em embriões de peixe-zebra (*Danio rerio*), análises de expressão génica e do desenvolvimento embrionário. Master in Biotecnologia para as Ciências da Saúde, UTAD. Supervisor: Ana Maria Coimbra (CITAB-UTAD) and Manuela Matos.
- [15] MSc: Vieira, F.A.A. (2013). As Particularidades da Gestão de Trânsito numa Empreitada. Master in Engenharia Civil, UTAD. Supervisor: Cristina Reis and Luís Filipe Sanches Fernandes (CITAB-UTAD).
- [16] MSc: Zacarias, S.A.S. (2013). Zalpha domains of the Z-DNA dependent protein kinase PKZ: From cloning to crystal structure, UTAD. Supervisor: Alekos Athanasiadis (IGC) and Rui M. F. Bezerra (CITAB-UTAD).
- [17] MSc: Gaspar, S.M: (2013). Influência das alterações climáticas em bacias de retenção. Master in Engenharia Civil, UTAD. Supervisors: Luís Filipe Sanches Fernandes and Mário Gonzalez Pereira (CITAB-UTAD).
- [18] MSc: Ramalho, C. F. (2013). Planeamento Territorial no Alto Alentejo. Master in Engenharia Florestal, UTAD. Supervisor: João P. F. Carvalho (CITAB-UTAD).

#### 5.2.5.8 Patents/propotypes

N/A

#### 5.2.5.9 Organization of conferences

- [1] 4th International Workshop on the Conservation of the Chough held at UTAD de 10<sup>th</sup> – 12<sup>th</sup> October 2013. Comissão Organizadora: João Alexandre Ferreira Abel dos Santos Cabral, Mário Santos, Francisco Morinha, Rita Bastos e Hélia Gonçalves.
- [2] Encontro de Paleoambiente e Etnobotânica. Organization: UTAD, 9-11 Maio 2013. Comissão Organizadora: João P. F. Carvalho.
- [3] 7<sup>as</sup> Jornadas de Biologia na UTAD, 21 a 23 de Novembro de 2013. Comissão Organizadora: Ana Maria Monteiro Paiva Coimbra.
- [4] European Geosciences Union General Assembly 2013: "Spatial and temporal patterns of wildfires: models, theory, and reality" (NH7.3/AS4.3/BG2.25/ESS1.8/NP4.6/SS5.24). Austria Center Vienna (ACV), Vienna, Austria, 07-12 April 2013. Comissão Organizadora: Organization: (Conveners) Mário Pereira, R. Trigo, M. Penning de Vries, Dr Clarisse Boschetti.
- [5] VIII Simpósio Internacional de Fauna Selvagem, realizado na Universidade de León (Espanha) nos dias 31 de Outubro a 3 de Novembro de 2013 e organizado pela WAVES. 144 posters; 46 comunicações orais e uma visita técnica. Comissão Organizadora: Aurora Carmen Monzón Capapé.
- [6] FLAIR Workshop. Instituto Dom Luiz (IDL), Faculdade de Ciências da Universidade de Lisboa (FCUL), Lisbon, Portugal, 18-19 June 2013. Comissão

- Organizadora: Mário Gonzalez Pereira (UTAD) e Carlos da Camara (IDF, DEGGE-FCUL).
- [7] Workshop “Monitorização de Populações de Cervídeos”, realizado nos dias 12 e 13 de Outubro na UTAD, aberto a 12 formandos. Comissão Organizadora a cargo da Waves Portugal/Unidade de Vida Selvagem da Univ. de Aveiro e Aurora Carmen Monzón Capapé.
- [8] Jornadas Técnicas Sobre Os Carvalhos. Terras de Bouro. Organization: Assoc. QUERCUS – ATHACA - Assoc. Port. Biólogos- UTAD, 24 Nov 2013. Comissão Organizadora: João P. F. Carvalho.
- [9] Curso Processamento de Sementes de Espécies Autóctones. Junho 2013, UTAD. Comissão Organizadora: João P. F. Carvalho.
- [10] Workshop “Maximização dos serviços do ecossistema vinha” realizado nos dias 13 e 14 de Novembro de 2013, com 250 participantes, 15 comunicações orais e uma visita técnica. Comissão Organizadora: Laura Torres.
- [11] Limnology workshop: 25th March 2013 as part of the XVI National Meeting of Biology Students: Organisers - Dr. Samantha Jane Hughes and Professor Simone Varandas.
- [12] Workshop “DNA barcoding of fungi”: XVI National Meeting of Biology Students, 23 a 26 de Março de 2013, Universidade de Trás-os-Montes e Alto Douro, Vila Real. Comissão Organizadora: Guilhermina Marques e Lav Sharma.
- [13] Documentário "A Lagoa", que teve a sua estreia no Teatro de Vila Real, a 5 julho. Comissão Organizadora: Paula Maria Seixas de Oliveira Arnaldo.
- [14] November 2012: mini course on “Endnote” software and management of bibliographical databases at UTAD for CITAB researchers and UTAD lecturers and students. Organised by Dr Samantha Jane Hughes (CITAB/UTAD) and Dr. João Carrola (CITAB/UTAD). Samantha Jane Hughes.
- [15] Fórum "Biodiversidade de Vila Real"; Teatro de Vila Real, a 22 e 23 de Março. Com 250 participantes, 6 paineis e uma mesa redonda, com um total de 30 oradores. Comissão Organizadora: Paula Maria Seixas de Oliveira Arnaldo, Joaão Cabral, Mário Santos, Aurora Monzon.
- [16] Sessão Nobel 2013. UTAD, Vila Real, Portugal, 11 December 2013. Comissão Organizadora: Mário Gonzalez Pereira, Marco Duarte Naia e Francisco Marinho.
- [17] WRF workshop: "Numerical Modelling of the Atmosphere". UTAD, Vila Real, 4 Novembro 2013. Com 15 participantes. Comissão Organizadora: Mário Gonzalez Pereira e Liliana Caramelo.



### 5.2.5.10 Industry contract research

El researchers carry out contracted research for key sector stakeholders. The data resulting from many of these contracts also serve for research projects.

Designation	Contractor	Implementation period	Value
Monitorização de atividades de quirópteros e prospeção da mortalidade de avifauna e quirópteros do Parque Eólico do Alto do Marco.	Parque Eólico de Gevancas, Lda	July 2011 to July 2013	11.266 €
Monitoring of River Cavado - Salamonde II and River Rabagão - Venda Nova III	LABELEC	May 2012 to April 2014	4.186 €
Produção de DVD de promoção e Guia interpretativo dos valores ecológicos do Percurso de Lamosa, Sernancelhe.	Câmara Municipal de Sernancelhe	July 2012 to February 2013	68.500 €
Programa "Long Term Ecological Research (LTER).	CIBIO - ICETA/UP	April to May 2013	4.500 €
Quantificação dos valores naturais e análise da sua relação com a atividade agrária na área de intervenção ITI-DI.	Direção Regional de Agricultura e Pescas do Norte (DRAPN)	June to December 2013	24.490 €
Aproveitamento Hidroelétrico de Baixo Sabor. Programa de Monitorização da Fauna – Quirópteros – Reforço de Monitorização de Espécies Fissurícolas e Arborícolas	EDP – Gestão da Produção de Energia, S.A.	April 2013 to February 2014	63.362,67 €
Aproveitamento Hidroelétrico do Douro Internacional – Picote – Reforço de Potência	Ecosfera, Consultoria Ambiental	February to December 2013	17.600,00 €
MC10 – Programa de Proteção e Valorização de Répteis, Anfíbios e Invertebrados no vale do Sabor, no âmbito do Aproveitamento Hidroelétrico do Baixo Sabor (AHBS)	Profico – Ambiente e Ordenamento, Lda	January to March 2013	3.587,32 €
Identificação de locais propícios para a colocação de caixas-abrigo para quirópteros e respetiva aplicação, ao abrigo das medidas compensatórias do Aproveitamento Hidroelétrico do Baixo Sabor	Bento Pedroso Construções e Lena Engenharia e Construções, ACE.	May 2012 to August 2013	11.580,00 €

Designation	Contractor	Implementation period	Value
Monitorização da Destruição de Abrigos de Quirópteros em Área a inundar (albufeiras do AHBS)	EDP – Gestão da Produção de Energia, S.A	November 2013 to January 2014	11.012,50 €
Medidas Compensatórias Nº 9 – Programa de protecção e valorização da avifauna rupícola no Nordeste Transmontano, no âmbito do Aproveitamento Hidroeléctrico do Baixo Sabor (AHBS).	EDP – Gestão da Produção de Energia, S.A	January 2012-2014	85.257 €
Medidas Compensatórias Nº 10 – Elaboração do Projecto para Implementação de Habitats Prioritários e Respetivo Plano de Gestão, no âmbito do Aproveitamento Hidroeléctrico do Baixo Sabor (AHBS)	EDP – Gestão da Produção de Energia, S.A	January 2013 to May 2014	36.000 €
Medidas Compensatórias Nº 10 – Programa de protecção de répteis, anfíbios e invertebrados no vale do Sabor, no âmbito do Aproveitamento Hidroeléctrico do Baixo Sabor (AHBS)	EDP – Gestão da Produção de Energia, S.A	January 2012-2014	74.822,67 €
Auditoria de metodologias de análise de risco de incêndio e de planeamento de gestão estratégica de combustíveis	GIFF S.A	January to May 2013	5.000,00 €
Validação dos caudais ecológicos nos empreendimentos de Fronhas e Alto Rabagão	PROFICO Ambiente e Ordenamento Lda	2013-2015	22.944 €
Valorização das Galerias Ribeirinhas do Programa Ambiental do Empreendimento de Odelouca	Águas do Algarve	2013-2014	15,902.00 €
Projectos de Execução relativos á Requalificação das margens do Estuário do Lima, na zona de Cardielos e Portuzelo.	Câmara Municipal de Viana do Castelo	Mars 2011-October 2013	40.000 €
Elaboração de um Estudo de Avaliação de Riscos de Rotura de Infraestruturas Hidráulicas e Definição de Metodologia de Intervenção e Interação no Sistema de Planeamento.	ARH-N	January 2013-Dez. 2014	57.000 €
Projecto para Implementação de Habitats Prioritários e Respetivo Plano de Gestão do Aproveitamento Hidroeléctrico do Baixo Sabor.	EDP	January 2013-June 2014	36.779 €

### 5.2.5.10.1 Internationalization

- [1] International Wildland Fire Association. Member of the Board of Directors. Paulo M. Fernandes.
- [2] 4<sup>th</sup> Fire Behaviour and Fuels Conference – At the Crossroads: Looking Toward the Future in a Changing Environment. St. Petersburg, Russia. Keynote lecture: Managing Fire in the Mediterranean Basin: Insights from Fire-Frequent Landscapes. Paulo M. Fernandes.
- [3] Fernandes, P., Loureiro, C., Pinto, A., Espinosa-Prieto, J. 2013. Fuel-fire relationships in blue gum (*Eucalyptus globulus*) litter. P. 85 In 4th Fire Behaviour and Fuels Conf. – At the Crossroads: Looking Toward the Future in a Changing Environment. Paulo M. Fernandes.
- [4] Pau Costa Foundation for Fire Ecology and Management. Supervisory Board member. Paulo M. Fernandes.
- [5] Short-Term Scientific Mission no âmbito da ação COST: FP0902. STSM title: Assessment of forest biomass for energy in Mediterranean ecosystems. Universidad de Castilla-La Mancha, Albacete, Spain. Helder Filipe dos Santos Viana.
- [6] VIII International Symposium on Wildlife. Universidad León. León. Spain. – Teixeira A., Varandas S., Sousa R., Froufe E., Lopes-Lima M. 2013. Ecological Patterns of Autochthonous Mussel Populations (*Margaritifera margaritifera*, *Unio delphinus*, *Anodonta anatina* and *Potomida littoralis*) of Douro Basin (NE Portugal). Threats and Conservation Measures. Simone da Graça Pinto Varandas
- [7] World Congress of Malacology. Ponta Delgada. Azores: – Lopes-Lima M., Teixeira A., Hinzmann M., Varandas S., Elsa Froufe E., Ronaldo Sousa R. e Machado J.. Host fish limitation, an additional threat to the imperiled naiads in Europe: a case study on *Unio delphinus* and *Potomida littoralis*. Simone da Graça Pinto Varandas
- [8] Joint National Meeting of the British Hydrological Society and Royal Geographical Society Biogeography Research Group: Urban Aquatic Ecosystems. Centre for Hydrological and Ecosystem Science, Loughborough University, – Coelho D., Hughes S.J., Varandas S. and Cortes R.M.V. Ecological Assessment and Requalification Measures of an urban river in Northern Portugal: the case of the Rio Corgo. Samantha Jane Hughes.
- [9] VIII Iberian Congress on Water Management and Planning. Calouste Gulbenkian Foundation, Lisbon, Portugal. 2013 (Dec. 5-7) Rui M. V. Cortes, Samantha J. Hughes, Simone G. P. Varandas, Vítor Pereira, Sandra Pereira, Ana Pinto, Ana M. Coimbra, Sara M. Monteiro. Biomarkers and bio-indicators: new tools for the assessment of ecological condition under the WFD. Rui M.V. Cortes.
- [10] VIII Iberian Congress on Water Management and Planning. Calouste Gulbenkian Foundation, Lisbon, Portugal. 2013 (Dec. 5-7). Hughes, S.J.; Cabecinha, E.; Santos, J.; Leite, S.; Aranha, J.; Lopes, D.; Cabral, J.; Santos, M.; Trindade, H.; Cortes,

- R.V.M. Modelling climate and land use change on the ecological and physicochemical quality of reservoirs in Northern Portugal. Samantha Jane Hughes.
- [11] Symposium for European Freshwater Sciences (SEFS 2013). Münster, Germany. 2013 (1-5 July). Rutschmann S., Gattoliat J-L, Hughes SJ, Baéz M, Sartori M, Monaghan M.T. Complex colonization of oceanic islands by mayflies (Ephemeroptera: Baetidae). Samantha Jane Hughes.
- [12] Symposium for European Freshwater Sciences (SEFS 2013). Münster, Germany. 2013 (1-5 July). Hughes SJ Oliveira B Cortes R: Preliminary assessment of chironomid pupal exuviae (Diptera Nematocera) as bioindicators in the rivers of northern Portugal. Samantha Jane Hughes.
- [13] Symposium for European Freshwater Sciences (SEFS 2013). Münster, Germany. 2013 (1-5 July). Cortes R., Hughes S.J., Varandas S., Pereira V., Pinto A., Coimbra A.M. e Monteiro S.M. Biomarkers and Bio-Indicators: combining the best of two worlds in river quality assessment. Rui M.V. Cortes.
- [14] Symposium for European Freshwater Sciences (SEFS 2013). Münster, Germany. 2013 (1-5 July). Pereira V., Hughes S., Varandas S. e Cortes R. A Preliminary Assessment of Fish Guilds as Indicators of Ecological Quality in Northern Portuguese Rivers. Vitor Pereira.
- [15] 8th Biennial Symposium: Recovery & Restoration from Concept to Implementation. Freshwater Mollusk Conservation Society. Guntersville, Alabama. USA. 2013 (10-14 March). Lopes-Lima M., Sousa R., Aldridge D., Araújo R., Bergengren J., Bódis E., Bouchet P., Douda K., Geist J., Killeen I., Lauceri R., Larsen B., Lois S., Lundberg S., Moorkens E., Motte G., Nagel K., Paunovic M., Paz O., Prié V., von Proschwitz T., Riccardi N. e Varandas S. Conservation status of European freshwater bivalves. Simone da Graça Pinto Varandas.
- [16] 8th Biennial Symposium: Recovery & Restoration from Concept to Implementation. Freshwater Mollusk Conservation Society. Guntersville, Alabama. USA. 2013 (10-14 March). Teixeira A., Varandas S., Sousa R., Froufe E. e Lopes-Lima M. Native mussel populations of Douro basin, Portugal: ecological patterns, main threats and conservation measures. Simone da Graça Pinto Varandas.
- [17] 8th Biennial Symposium: Recovery & Restoration from Concept to Implementation. Freshwater Mollusk Conservation Society. Guntersville, Alabama. USA. 2013 (10-14 March). Froufe E., Sobral C., Teixeira A., Sousa R., Varandas S., Aldridge D.C. e Lopes-Lima M. *Anodonta anatina* COI mtdna phylogeography: starting point of the species' evolutionary history disentangling. Simone da Graça Pinto Varandas.
- [18] 8th Biennial Symposium: Recovery & Restoration from Concept to Implementation. Freshwater Mollusk Conservation Society. Guntersville, Alabama. USA. 2013 (10-14 mar.). Froufe E., Teixeira A., Lopes A., Cardoso J., Reis J., Machado J., Hinzmann M., Fonseca M., Araujo R., Sousa R., Sobral C., Varandas S., Cortes R. e Lopes-Lima M. CONBI: biodiversity and conservation of

- bivalves of Iberia (southern Europe) – ecogeographic, genetic and physiological information. Simone da Graça Pinto Varandas.
- [19] Evolution and endemism in a morphologically cryptic group of aquatic insects (Ephemeroptera, Baetidae) on the islands of northeastern Macaronesia. Field collections of endemic Ephemeroptera on the island of Madeira. Carried out in collaboration with and financed by the Leibniz-Institute of Freshwater Ecology and Inland Fisheries, Berlin, Germany. Samantha Jane Hughes.
- [20] Field work (sampling chironomid pupal exuviae) July and November 2013 Study of the chironomid communities of the high altitude lakes of Central Portugal and Northern Spain. Coordinator: Samantha Jane Hughes.
- [21] REFRESH - "Freshwater Management in a Changing World", 2 day Science Symposium and Stakeholder Meeting, University College London, United Kingdom. Samantha Jane Hughes.
- [22] Forest Management in Protected Areas. Natural Park 'Podyjí' - Správa Národního Parku Podyjí, Rep. Checa. João Paulo Fidalgo Carvalho.
- [23] 9th Iberian and 6th Iberoamerican Congress on Environmental Contamination and Toxicology, 1. Participação de: Cortes R., Coimbra A., Monteiro M., Fontainhas-Fernandes A., Carrola J., Pereira S., Pinto A.
- [24] Universidade Complutense de Madrid, reunião de trabalho no âmbito do projeto PTC/CTV/102453/2008. Ana Maria Monteiro Paiva Coimbra.
- [25] 12th FELASA and 12th SECAL joint congress: "Animal Research: Better Science from Fewer Animals", 10-13 June, Barcelona, Spain. Ana Maria Monteiro Paiva Coimbra.
- [26] Euroanaesthesia 2013 Congress, 1-4 June 2013, Barcelona, Spain. Ana Maria Monteiro Paiva Coimbra.
- [27] SEB Main Meeting, 3-6 July, Valencia, Spain. Participação de: Cortes R., Hughes S. J., Varandas S., Pereira V., Pereira S., Coimbra A., Monteiro M., Pinto A., Fontainhas-Fernandes A., Carrola J., Pereira S., Pinto A., Luzio, A.
- [28] Symposium Oak Coppice Forests – Sustainable Management and Biodiversity. University of Mendel, Faculty of Forestry and Wood Technology, Brno - Rep. Checa. João P.F. Carvalho.
- [29] Field work (sampling freshwater bivalves) May and September 2013 in different rivers of Morocco together in collaboration with Prof. Dr. Mohamed Ghamizi, Natural History Museum of Cadi Ayyad University of Marrakech and Faculty of Sciences Semlalia, Marrakesh, Cadi Ayyad University was the person responsible for the work done in collaboration. Elaboration of species listed in the IUCN as endangered (*Margaritifera marrocana*). Simone da Graça Pinto Varandas.
- [30] Field work (sampling freshwater bivalves) in different rivers and lakes of central and southern Italy with the Institute of Ecosystem Study, Pallanza in Verbania, Italy, August 2013. Talks on future collaborations and exchange of knowledge

with CITAB/UTAD, IPB and ICBAS - CIIMAR and start of scientific article based on collections. Simone da Graça Pinto Varandas.

### 5.2.5.11 Other publications National

- [1] Pinto, T., Lousada, J.; Louro, G.; Machado, H.; Nunes, L. (2013). Recolha de biomassa florestal: avaliação dos custos e tempos de trabalho. *Silva Lusitana*, 163–176.
- [2] Lopes, L., Bento, J., Cristovão, A., Baptista, F.O., Fernandes, P.M. 2013. Institucionalização da propriedade comunitária em Portugal: tendências trágicas entre “Baldios” e “Anti-Baldios”. P. 37-38 *In Conferência Nacional do Projeto ForeStake – Livro de Resumos. Universidade de Aveiro.*
- [3] Marta-Costa, A., Pinto, R., Manso, F.T., Tibério, L., Carneiro, I., Fernandes, P. 2013. Participação no planeamento e gestão florestal do Sítio da Serra do Montemuro: a preceção dos agentes locais. P. 10-12 *In Conferência Nacional do Projeto ForeStake – Livro de Resumos. Universidade de Aveiro.*
- [4] Ferreira, A., Louro, A., Marta-Costa, A., Fidalgo, B., Ribeiro, C., Figueiredo, E., Torres, F.M., Marsh, G., Botelho, H., Carneiro, I., Gaspar, J., Keizer, J., Portela, J., Saldanha, L., Tibério, M., Fernandes, P., Roebeling, P., Pinto, R., Salas, R., Valente, S., Carvalho, T., Correia, T. 2013. Projeto ForeStake: o papel dos agentes locais no sucesso da plática florestal em áreas afectadas por incêndios em Portugal. P. 3-5 *In Conferência Nacional do Projeto ForeStake – Livro de Resumos. Universidade de Aveiro.*
- [5] Fernandes, P., Loureiro, C., Pinto, A., Espinosa-Prieto, J. 2013. Fuel-fire relationships in blue gum (*Eucalyptus globulus*) litter. P. 85 *In 4th Fire Behaviour and Fuels Conf. – At the Crossroads: Looking Toward the Future in a Changing Environment*
- [6] Lopes, L., Bento, J., Cristovão, A., Baptista, F.O., Fernandes, P.M. 2013. Institucionalização da propriedade comunitária em Portugal: tendências trágicas entre “Baldios” e “Anti-Baldios”. P. 312 *In Bento, J., Lousada, J., e Teixeira, A. (Eds.), 7º Congresso Florestal Nacional – Conhecimento e Inovação: Resumos. SPCF.*
- [7] Lopes, L., Bento, J., Fernandes, P.M. 2013. A riqueza das florestas nacionais. Uma abordagem alternativa à da Estratégia Nacional para as Florestas. P. 235 *In Bento, J., Lousada, J., e Teixeira, A. (Eds.), 7º Congresso Florestal Nacional – Conhecimento e Inovação: Resumos. SPCF.*
- [8] Oliveira, T.M., Barros, A.M.G., Fernandes, P.M. 2013. Análise e quantificação espacial do risco de incêndio por simulação do comportamento do fogo: Odemira e Torres Vedras. P. 178 *In Bento, J., Lousada, J., e Teixeira, A. (Eds.), 7º Congresso Florestal Nacional – Conhecimento e Inovação: Resumos. SPCF.*
- [9] Oliveira B, Hughes S.J and Cortes R.M.V. The use of chironomid Pupal Exuviae (Diptera: Chironomidae) in the integrated monitoring of rivers in northern

- portugal: A first approach. In Bento, J., Lousada, J., e Teixeira, A. (Eds.), 7º Congresso Florestal Nacional – Conhecimento e Inovação: Resumos. SPCF.
- [10] Pereira V., Rocha R., Varandas S., Hughes S., Santos C. e Cortes R. “Avaliação do Estado das Massas de Água da Região Norte de Portugal”. In Bento, J., Lousada, J., e Teixeira, A. (Eds.), 7º Congresso Florestal Nacional – Conhecimento e Inovação: Resumos. SPCF.
- [11] Lopes M., Sampaio A., Hughes S.J., Varandas S. e Cortes, R.V. “Avaliação preliminar da decomposição de folhada de Amieiro em rios com diferentes gradientes de poluição”. (In Bento, J., Lousada, J., e Teixeira, A. (Eds.), 7º Congresso Florestal Nacional – Conhecimento e Inovação: Resumos. SPCF.
- [12] Santos C., Pereira V., Varandas S., Cortes R., Hughes S., Lopes M., Barreira J. e Teixeira A. “Estado de conservação das massas de água e das populações de bivalves de água doce na Região Hidrográfica 3 (RH3)”. (In Bento, J., Lousada, J., e Teixeira, A. (Eds.), 7º Congresso Florestal Nacional – Conhecimento e Inovação: Resumos. SPCF.
- [13] Coelho D., Varandas S., Hughes S.J. e Cortes R. “Diagnóstico ambiental do rio Corgo nos troços médio e inferior e determinação da preferência de habitat de espécies alvo”. In Bento, J., Lousada, J., e Teixeira, A. (Eds.), 7º Congresso Florestal Nacional – Conhecimento e Inovação: Resumos. SPCF.
- [14] Freitas, A., Fernandes, P. 2013. Caracterização do comportamento do fogo e definição da prescrição de fogo controlado em matos de *Ulex europaeus* no NW português. P. 172 In Bento, J., Lousada, J., e Teixeira, A. (Eds.), 7º Congresso Florestal Nacional – Conhecimento e Inovação: Resumos. SPCF.
- [15] Fernandes, P.M., Loureiro, C., Pezzatti, G.B., Torres Manso, F., Lopes, L. 2013. Alterações e determinantes do regime de fogo na floresta pública (1943-2011). P. 170 In Bento, J., Lousada, J., e Teixeira, A. (Eds.), 7º Congresso Florestal Nacional – Conhecimento e Inovação: Resumos. SPCF.
- [16] Botequim, B., Fernandes, P., Gonzalo-Garcia, J., Borges, J.G. 2013. Modelação do comportamento do fogo como suporte à articulação de processos de planeamento da gestão florestal com estratégias de silvicultura preventiva. P. 167 In Bento, J., Lousada, J., e Teixeira, A. (Eds.), 7º Congresso Florestal Nacional – Conhecimento e Inovação: Resumos. SPCF.
- [17] Carlos C., Gonçalves F., Sousa S., Val M.C., Teixeira B., Melada C., Silva L., Garcia-Cabral I. and Torres L. (2013). *Ephestia unicolor* e *Cadra figulilella*: duas novas “traças-da-uva” presentes nas vinhas do Douro. *Actas do 9º Simpósio de Viticultura do Alentejo*. 159-166. <http://www.ivv.min-agricultura.pt/np4/4781.html>
- [18] Gabriel, R., Moreira, H., Alençõ, A., Sousa, L., Cabecinha, E., Faria, A. (2013). Book of Abstracts of the 2nd Seminar on Biomechanics, Health and Sustainable Environment: Contributions to a Brand Quality. The Marcaduro Project. Vila Real. <http://marcaduro.utad.pt/en/home.html>

- [19] Gomes M.E., Gabriel, R., Santos, J., Alençõo, A., Sousa, L., Moreira, H., Cabecinha, E., Mendonça, S., Martins, L. (2013). The International Douro Cliffs – contributions to a sustainable development of rural tourism in a Portugal-Spain cross-border area. *Proceedings of ORTE 2013 - International Conference on Rural Tourism*. 333-345. Aveiro. <http://cms.ua.pt/orte/?q=node/39>
- [20] Jesus, J., Gonçalves, A-T., Mina, I. and Borges, M-T. (2013). Halotolerant Plants for Phytoremediation in Saline Environments. *4<sup>o</sup> Workshop Anual Bioplant. Universidade do Porto*.
- [21] Oliveira, L.M., Almeida, A.M. and Mina, I.A-P. (2013). Carga orgânica adicionada a FitoETAR por colmos de *Phragmites australis* mantidos nos leitos durante o outono/inverno. *4<sup>o</sup> Workshop Anual Bioplant. Universidade do Porto*.
- [22] Regina S., Sanches Fernandes L.F., Moura J.P. and Pereira M.G. (2013). Impacto de alterações climáticas na hidrologia da bacia do Rio Beça. *7<sup>o</sup> Seminário de Recursos Geológicos, Ambiente e Ordenamento do Território*. <http://www.engenhariacivil.com/seminario-recursos-geologicos>
- [23] Santos C., Varandas S., Lopes M., Pereira V., Santos P. e Teixeira A. 2013. Continuidade fluvial em Mini-Hídricas – O caso da Ribeira de Santa Natália. In: Atas do 7<sup>o</sup> Congresso Florestal Nacional: Conhecimento e Inovação, pp. 430-440. Vila Real/Bragança.
- [24] Teixeira A., Varandas S., Sousa R., Froufe E. e Lopes-Lima M. 2013. Bioecologia dos mexilhões de água doce (Unionidae) nos rios Sabor, Tua e Tâmega (Bacia do Douro, Portugal): Principais ameaças e medidas de conservação: Principais ameaças e medidas de conservação. In: Atas do 7<sup>o</sup> Congresso Florestal Nacional: Conhecimento e Inovação, pp. 509-520. Vila Real/Bragança. 509-520pp.
- [25] Valle Junior R.F., Varandas S.G.P., Fernandes L.F.S., Pacheco F.A.L. 2013. Impact of land use conflicts on the quality of groundwater from the Sordo River hydrographic basin. In: Pacheco, F.A.L., Coke, C.J.M., Lourenço, J.M.M., Costa, M.R.M. & Vaz, N.M.O.C.M. (Edts). Livro de Atas do VII Seminário Recursos Geológicos, Ambiente e Ordenamento do Território, pp. 41-50. ISBN: 978-989-704-153-2. <http://www.engenhariacivil.com/seminario-recursos-geologicos>
- [26] Valle Junior R.F., Varandas S.G.P., Fernandes L.F.S., Pacheco F.A.L. 2013. Caracterização morfométrica da bacia do rio Sordo e determinação do uso potencial do solo. In: Atas do 7<sup>o</sup> Congresso Florestal Nacional: Conhecimento e Inovação, pp. 220-231. Vila Real/Bragança. <https://bibliotecadigital.ipb.pt/bitstream/10198/8673/4/Oral%20Nac.%2037.pdf>
- [27] Viana, H, Vega-Nieva, DJ, Ortiz Torres, L, Lousada, J and Aranha, J (2013). Principais características da biomassa e propriedades da cinza de combustão de matos nativos do Norte de Portugal e NW de Espanha. 538-546. 7<sup>o</sup>



- Congresso Florestal Nacional.  
[http://www.citab.utad.pt/refbase/files/2934\\_Viana.pdf](http://www.citab.utad.pt/refbase/files/2934_Viana.pdf)
- [28] Fraga I., J. Coutinho, Bezerra R., Dias A.A: Marques G., Nunes F.M. Effect of culture medium composition on the structural features of exopolysaccharides produced by *Ganoderma lucidum* in submerged culture. 8º Encontro Nacional de Cromatografia 2-4 de Dezembro de 2013, Covilhã Universidade da Beira Interior pp: 299-300.
- [29] Alves, A; Barros, C; Gama, A; Bezerra, R ; Mourao, J; Rodrigues, M The effect of white-rot fungi on *Jatropha curcas* l. pressed-seed cake detoxification on chicks visceral organs "Meeting of the European Society of Veterinary Pathology / Annual Meeting of the European College of Veterinary Pathologists" 2012-09-05-2012-09-08) León (ESP). In: ESVP/ECVP Proceedings 2012. Oxford (GBR): Elsevier Science (Journal of Comparative Pathology, 148 (1)), 2013. 73 (indexado no SCI)
- [30] Sampaio, A., Dias, A.A., Bezerra, R.M.F., Cortes, R.M. (2013). How will leaf decomposition in a forested wetland be affected by climate change? MicroBiotec 2013. SPM/SPBT. Aveiro, Portugal, 6 a 8 Dezembro. Abstracts Book, Pp. 214.
- [31] Torres, L. (2013). O projeto "EcoVitis: maximização dos serviços do ecossistema vinha na região demarcada do douro". Revista da APH nº 112: 29-32. [http://www.aphorticultura.pt/Revista/REVISTA\\_112\\_INDICE.pdf](http://www.aphorticultura.pt/Revista/REVISTA_112_INDICE.pdf)
- [32] Torres L. (2013). O vector da flavescência dourada da videira, *Scaphoideus titanus* (Ball.) e o combate da doença em viticultura no modo de produção biológico. O Segredo da Terra, 36: 45-50. <http://www.edibio.pt/>

#### 5.2.5.12 Government/Organization contract research

N/A

#### 5.2.5.13 Awards

InAqua Fund of the Lisbon Oceanarium and National Geographic Channel (15,000€) awarded to the Paeloris project: *Characterization and protection of native species of bivalves in coastal lagoons of Barrinha de Mira, Mira Lagoon, Lake Vela and Braças Lagoon*. March 2013 to February 2014. Awarded to Simone da Graça Pinto Varandas.

## 5.2.6 Future research

### 5.2.6.1 Objectives

EI members are also developing an international doctoral programme in “Biodiversity and Environmental Sustainability” with national and international partners for FCT funding. Participation in the ecotoxicological area of the doctoral programme Campus do Mar will be intensified. The international doctoral programmes draw upon known areas of expertise of members with direct relevance to specific sectors of the employment market, raising the national and international profile of CITAB/UTAD and collaborators. The international doctoral programme will attract paying participants with at least degree level qualifications, creating an alternative source of funding.

### **Project #03 - Biodiversity, Environmental Assessment & Biotechnology**

**Task #3.01 – Studies on the effect of climate change & extreme events on natural & modified aquatic systems:** Work will continue on rivers & reservoirs & effects of land uses/cover on aquatic system integrity. Planned activities include multivariate analyses of land use, landscape metrics & pressure parameters as predictors & drivers of ecological quality using integrated biological quality elements; development of predictive models for extrapolating ecological status & predicting climate changes effects in surface water bodies; ecological assessment of restoration & rehabilitation programmes in aquatic ecosystems & threatened aquatic species & integration of findings into the Water Framework Directive.

**Task #3.02 - Effect of water contamination in fish populations:** This task will continue to assess the use of biomarkers as valuable, rapid & reliable “early warning system” of environmental contamination linked to sub-organism level processes via associations between results & particular stressor agents.

**Task #3.03 – - Dynamic & spatially dynamic modelling:** Activities for 2014 include: testing the applicability of a novel spatially explicit modelling framework to predict ecological indicator responses to environmental change at local & regional levels; use of integrative modelling frameworks, scenarios & projections developed to improve ecological integrity management models. The FCT funded project “IND\_CHANGE - modelling tools based on indicators to predict changes in the landscape & promote the application of research on socio-ecological adaptive management planning” PTDC/AAG-MAA/4539/2012 will continue to develop project tasks.

**Task #3.04 - Application of microorganisms in biotechnology & in nutrient cycling:** Research on autochthonous bacteria, yeasts & fungi in bioremediation & as functional indicators of ecological quality of degraded ecosystems will be extended. The use of microorganisms & their enzymatic extracts in sewage treatment processes & bioconversion of lignocellulose in added value products will be promoted.

### **Project #04 – Disturbance of forest & agro-forested ecosystems**

**Task #4.01 - Fire Ecology & Management:** To establish links between fire environment, fire behaviour & fire effects in eucalyptus plantations; to understand how fire policy options affect the effectiveness of fire management in Portugal

**Task #4.02 - Fire regime analysis & assessment of the influence of weather & climate in agro forested ecosystems:** To select, develop and apply new methodologies for analyzing the fire regime; assessment of the influence of weather, climate and climate change the occurrence and burnt areas by forest fires and on chestnut productivity.

**Task #4.03 - Conservation of endangered insect species:** Work will continue on the conservation of the blue alcon butterfly (*Maculinea alcon*) in the Alvão Natural Park. This project is the only national initiative on the conservation of this species. Tasks for 2014 include: The study of life cycle related ecological issues to improve conservation measures: determination of *P. alcon* flight periodicity, oviposition preferences & determination & identification of its host ant species; Identification of new populations; Development of strategies for green corridors construction between populations; Genetic characterization of populations.

**Task #4.04 - Increasing functional biodiversity in olive groves: conservation and biological control of insect pests & maximizing ecosystem services:** Planned activities for increasing functional biodiversity in olive groves to enhance conservation & biological pest control include: Phenological model to simulate olive moth (*Prays oleae*), population dynamics in different agricultural scenarios; Syrphid communities of olive groves in NE Portugal; Food resources required to maximize conservation biological control exerted by *Episyrphus balteatus*.

Planned activities for maximizing ecosystem services provided by Porto Wine Region vineyards include: Development of spatial analysis methodology to support ecological infrastructure network activities on local farms & the application of “friendly” mating disruption technique to control *Lobesia botrana* to promote farm biodiversity; Plant species to be used in ecological infra-structure networks to maximize conservation; biological control against *L. botrana*.

## 5.3 Biosystems Engineering

### 5.3.1 Group description

Principal Investigator	José Luís Penetra Cerveira Lousada
Research area	Engineering
Home Institution	Universidade de Trás-os-Montes e Alto Douro

### 5.3.2 Funding

	2010	2012	2013
FCT Projects	140.660,67 €	176.336,71€	271.840,51€
Other (National)	334.047,13 €	361.619,14€	277.894,67€
Other (International)	95.024,60 €	125.824,00€	178.038,00€
Industry (National)	0,00 €	0,00€	0,00€
Industry (International)	0,00 €	0,00€	0,00€
<b>Total</b>	<b>569.732,40€</b>	<b>663.779,85€</b>	<b>727.773,17€</b>

### 5.3.3 Objectives

The general objective is the development of engineering technologies applied to agri-forestry systems, the environment and life towards providing sustainable development and better quality of life. Biosystems Engineering (BE) group research activities are focused into two ongoing projects.

#### Project #1 - Wood mechanical and quality evaluation

This task aims the mechanical characterisation of bio-based materials through novel methodologies coupling full-field optical techniques with inverse identification methods. This project aims to develop a materials science approach to wood mechanics, from the micro to macro levels. This is fundamental for promoting wood as a thoroughly characterized engineering material. The project also aims to improve bioenergetic conversion technology of agricultural and forest materials and wastes.

## Project #2 - Image-based systems

This project designed and developed computer vision and image processing based systems and solutions in the areas of agro-forestry, environment and biology. Image-based systems can be used in the guidance or control of many agricultural and food processes, providing a cheap, consistent and objective assessment for inspection, evaluation and measurement purposes. Artificial Intelligence and Soft Computing techniques, namely Fuzzy Sets Theory and its extensions, are also to be applied in image based feature/object tracking in team sports analysis. The complexity involved in these types of multi-tracking problems is huge. BE researcher work to better unravel this complexity by developing processes with necessary flexibility, while maintaining accuracy.

### 5.3.4 Main achievements

#### Project #1 – Wood mechanical and quality evaluation

The mechanical performance and quality of wood and wood-based materials are have addressed through novel methodologies by coupling full-field optical techniques with inverse identification methods. This project aimed to the development of a materials science approaches to wood mechanics, from the micro to macro levels. This is fundamental for promoting wood as a thoroughly characterized engineering material. The work is focused on the development of new experimental and numerical methods to identify the mechanical and fracture constitutive laws of wood and wood-based materials. The experimental and numerical tools developed in the context of mechanics of wood and wood-based materials and products are also applied to the mechanical behavior of cortical bone tissue.

The main outcomes are:

- 🕒 Development of a new identification method of elastic properties of wood at the growth ring scale (earlywood and latewood) by coupling digital image correlation techniques with the virtual fields method.
- 🕒 Development of a direct identification strategy of cohesive laws for wood and adhesively-bonded wood joints, under pure modes I and II, and mixed-mode I/II. This method is based on the loading – displacement curve and on the crack opening displacement, measured through the digital image correlation technique.
- 🕒 Development of advanced computational tools based on interface finite elements and cohesive zone modeling, to model the mechanical performance of wood dowel joints and repair solutions using carbon-fibre reinforced plastics.
- 🕒 Development of strengthening techniques of dowel type wood connections, based on metallic inserts and CFRP laminates.
- 🕒 Development of identification methods for variation patterns of wood density components in *Quercus faginea*, *Quercus suber*, and *Acacia melanoxylon*.

- 🕒 Development of evaluation methods for the physical, chemical, mechanical and anatomical properties of the *Quercus faginea*, *Quercus suber*, *Eucalyptus grandis*, and *Acacia melanoxylon* hardwoods and *Pinus pinaster* and *Pinus sylvestris* softwoods regarding quality assessment and most suitable uses.

## Project #2 – Image-based systems

During 2013 special attention continued to be paid to vine/grape innovative evaluation methods using conventional or hyperspectral imagery, alongside with work on meat evaluation, on object tracking, on the improvement of biological models and on device-independent image visualization techniques and data transmission. The continuous interest on the knowledge transfer to society has resulted in two patents, one granted and one pending.

The main outcomes are:

- 🕒 Development of image-based classification methodologies through image segmentation techniques using FSs, IVFSs, A-IFSs, NN and other computational intelligence techniques, and its application for agro-products quality assessment.
- 🕒 Development of a novel non-invasive hyperspectral image based methodology for variety and clone identification in vines.
- 🕒 Development of a novel non-invasive hyperspectral image based methodology for anthocyanin concentration estimation in vinegrapes.
- 🕒 Development of a novel hyperspectral image based methodology for intra growth ring measurement of wood density.
- 🕒 Development of a novel image based methodology for meat quality estimation.
- 🕒 Development of a novel methodology for object tracking.
- 🕒 An experimental methodology to be applied in natural territories and smart sustainable cities to improve the carbon footprint by promoting more intelligent use of energy.
- 🕒 An experimental methodology was developed to predict lower limb biomechanics (over) loading during a walking trail that includes relevant information and proposes for a standardised survey and grading methodology, which can be employed to assess the ability of a trail in promoting a healthy lifestyle.
- 🕒 Submission of a patent on a radiographic accessory for measuring passive hip laxity in the dog.

### 5.3.5 Mobility

Regular visits to key anchor and collaborating institutions included to La Rioja University in Logroño, Spain, and the Universidad Pública de Navarra (joint publications and projects submission and a Erasmus Mobility Grant for Professor Humberto Bustince, Prof. Eurne Barrenechea and Prof. Miguel Pagola).

## 5.3.6 Group productivity

### 5.3.6.1 International Projects

BE researchers participated in 4 international projects during 2013:

Project name	Funding
ADAPTACLIMA II - Adaptation to Climate Change in SUDOE. CITAB coordinator: Ronaldo Gabriel. Starting Date: November 2012, duration: 24 months (SUDOE "SOE3/P2/E477")	100.000 €.
Computer Vision for UAV. CITAB coordinator: Pedro Pinto. Starting Date: January 2011, duration: 24 months (DPI2010-20751-C02-01)	140.000 €
MARCADUERO "MARCA DUERO DURADERO: Sostenibilidad, Calidad y Promoción". CITAB coordinator: Ronaldo Gabriel. Starting Date: June 2011, duration: 30 months (0363_MARCADUERO_2_E)	106.980 €
New Information Representation and Aggregation Model using Fuzzy Sets Extensions. Applications. CITAB coordinator: Pedro Pinto. Starting Date: January 2011, duration: 24 months	30.492 €

### 5.3.6.2 National Projects

BE researchers participated in 13 national projects during 2013:

Project name	Funding
Acoustic and optical communications. CITAB Coordinator: Norberto Gonçalves. Starting Date: January 2013, duration: 24 months. (Ciência Viva)	N/A
Biochemical, morphological and functional evaluation of breast cancer-induced muscle wasting: the role of exercise training. CITAB Coordinator: Mário Ginja. Starting Date: March 2011, duration: 36 months. (PTDC/DES/114122/2009)	65.000 €
BioGN. CITAB coordinator: Nuno Afonso Moreira. Starting Date: September 2010, duration: 36 months (QREN – SI Inovação)	170.000 €
Biochemical, morphological and functional evaluation of breast cancer-induced muscle wasting: the role of exercise training. CITAB coordinator: Mário Ginja. Starting Date: March 2011, duration 36 months (PTDC/DES/114122/2009)	65.000,00 €
Fracture behaviour of cortical bone under mixed-mode I+II loading. CITAB coordinator: José Morais. Starting Date: April 2012, duration 36 months (PTDC/EME-PME/119093/2010)	24.000€

Project name	Funding
Douro Empreendedor. CITAB coordinator: Carlos Serôdio. Starting Date: January 2012, duration: 24 months (SIGON2QREN – ON2-NORTE-07-0927-FEDER-001).	228.685 €
Hyper - Application of hyperspectral imaging and neural networks to viticulture. CITAB coordinator: Pedro Pinto. Starting Date: April 2012, duration: 36 months PTDC/EEA-AUT/121056/2010	74.910 €
"Intelligent and Integrated System for Monitorization, Control and Management of Roads Infrastructure". CITAB coordinator: Carlos Serôdio. Starting date: September 2012, duration: 24 months (QREN)	198.000€
Numerical and experimental study of cohesive laws in bonding wood joints. CITAB coordinator: José Morais. Starting Date: January 2011, duration 36 months (PTDC/EME-PME/114443/2009)	38.761 €
Phenotypic plasticity of maritime pine to climate change. CITAB coordinator: José Louzada. Starting Date: November 2010, duration 36 months (PTDC/AGR-CFL/099614/2008)	14.400 €
Scots pine in Portugal: the "Southwest end" or just "the end"? CITAB coordinator: José Luís Penetra Cerveira Louzada. Starting Date: January 2011, duration: 36 months. (PTDC/AGR-CFL/110988/2009).	181.781,13 €
Strategic Information for Pine Row. CITAB coordinator: Maria Emilia da Silva. Starting Date: June 2010, duration: 36 months. INEF-PINUS (Acção 4.2.2, PRODER)	117.223,13 €
Waste Management Performance Assessment. CITAB coordinator: Carlos Afonso teixeira. Starting Date: June 2011, duration: 24 months. Promotor: Sociedade Ponto Verde and Câmara Municipla de Lisboa	15.571 €

### 5.3.6.3 Publications in peer review Journals

BE Researchers published a total of 31 articles in SCI/JCR journals in 2013:

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- [3] Arteiro, A., Catalanotti, G., Xavier, J. and Camanho, P.P. (2013). Notched response of non-crimp fabric thin-ply laminates. *Composites Science and Technology*. 79: 97-114. <http://www.sciencedirect.com/science/article/pii/S0266353813000390>
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- [10] Dourado N.M., Pereira F.A.M., Moura M.F.S.F. and Morais J.J.L. (2013). Bone fracture characterization using the ENF. *Materials Science and Engineering: C*. 33: 405-40. <http://www.sciencedirect.com/science/article/pii/S0928493112004389>
- [11] Ercin, G.H., Camanho, P.P., Xavier, J., Catalanotti, G., Mahdi, S. and Linde, P. (2013). Size effects on the tensile and compressive failure of notched composite laminates. *Composite Structures*. 96: 736-744. <http://www.sciencedirect.com/science/article/pii/S0263822312004795>
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- [2] Catalanotti, G., Xavier, J. and Camanho, P.P. (2013). Fracture toughness and crack resistance curves in the longitudinal compressive failure of polymer composites. *IV ECCOMAS Thematic Conference on the Mechanical Response of Composites, University of the Azores, Ponta Delgada, Azores, Portugal, 25-27 September, 2013.*
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- [14] Pinto, V., Xavier, J., Pinto, A., Magalhaes, F.D. and Guedes, R. (2013). Estudo mecânico de nanocompósitos PLA/GNP e compósitos PLA/biovidro para desenvolvimento de dispositivo ligamentar. *5º Congresso Nacional de Biomecânica (CNB2013), Fórum de Arte e Cultura de Espinho, Espinho, Portugal, 8-9 Fevereiro 2013.*
- [15] Pirralho, M., Louzada, J., Pereira, H. and Knapic S. (2013). Variação de densidade em madeira de eucalipto: estudo comparativo de seis espécies. *Proceedings de artigos do 7º Congresso Florestal Nacional.* 384-391. Congresso Florestal Nacional.
- [16] Sousa, A., Gabriel, R., Faria, A., Aragão, F. and Moreira, M. (2013). Analysis of the association between the abdominal visceral adiposity and the time parameters of reactive forces to the support during postmenopausal women walk. *Proceedings of the XXIV Congress of the International Society of Biomechanics.* . Natal, Brasil.
- [17] Teixeira, M., Ferreira, D., Cunha, V., Feio, A., Lousada, J., Varum, H., Guedes J. and Pinto J. (2013). A contribution to assess the structural vulnerability of traditional timber pavements. *Proceedings of the 4th International Conference on Integrity, Reliability and Failure.* 655-656. 4th International Conference on Integrity, Reliability and Failure.
- [18] Valter Silva, N.Couto, J. Alexandre and A. Rouboa (2013). Analysis of the Pine Biomass Gasification to Obtain H2 Enriched Syngas. *Advanced Science Letters.*
- [19] Valter Silva, N. Couto, J. Alexandre and A. Rouboa (2013). Syngas Combustion: Analysis of Exergy Losses. *Advanced Science Letters.*
- [20] Xavier, J., Belini, U., Pierron, F., Morais, J., Lousada, J. and Tomazello, M. (2013). Characterisation of stiffness components of medium density fiberboard panels by heterogeneous plate bending tests. *1st International Conference on Natural Fibers: Sustainable Materials.*

### 5.3.6.5 Other National publications

- [1] Fonseca, J., Gabriel, R., Tavares, J., Aragão, F., Leite, A., Faria, A., Moreira, H. (2013). Relação das forças reativas do apoio durante o caminhar e a atividade física em mulheres pós-menopáusicas. *Livro de Resumos do 5º Congresso Nacional de Biomecânica.* pp. 33-37. Espinho, Portugal.
- [2] Pereira, J.L., Xavier, J., Morais, J. and Lousada, J. (2013). Avaliação da qualidade da madeira de *P. pinaster* através da variação espacial das propriedades elásticas

perpendiculares ao grão, ao nível do tronco. *7º Congresso Florestal Nacional "Florestas - Conhecimento e Inovação", Vila Real/Bragança, Portugal, 5-8 de Junho de 2013.*

- [3] Pereira, M., Gabriel, R., Aragão, F., Fonseca, J., Leite, A., Faria, A., Moreira, H. (2013). Forças reativas do apoio durante o caminhar e densidade mineral óssea do calcâneo em mulheres pós-menopáusicas. *Livro de Resumos do 5º Congresso Nacional de Biomecânica*. 39-44. Espinho, Portugal.
- [4] Pinto, V., Xavier, J., Pinto, A., Magalhaes, F.D. and Guedes, R. (2013). Estudo mecânico de nanocompósitos PLA/GNP e compósitos PLA/biovidro para desenvolvimento de dispositivo ligamentar. *5º Congresso Nacional de Biomecânica (CNB2013), Fórum de Arte e Cultura de Espinho, Espinho, Portugal, 8-9 Fevereiro 2013.*
- [5] Viana, H, Vega-Nieva, DJ, Ortiz Torres, L, Lousada, J and Aranha, J (2013). Principais características da biomassa e propriedades da cinza de combustão de matos nativos do Norte de Portugal e NW de Espanha. 538-546. *7º Congresso Florestal Nacional*. [http://www.citab.utad.pt/refbase/files/2934\\_Viana.pdf](http://www.citab.utad.pt/refbase/files/2934_Viana.pdf)

### 5.3.6.6 Book Chapters

- [1] Franco, C., Tinguaro-Rodriguez, J., Melo-Pinto and P., Montero, J.. (2013). Intuitionistic Fuzzy Preference Structures. In *New Trends in Fuzzy Sets, Intuitionistic Fuzzy Sets, Generalized Nets and Related Topics*. K. Atanassov, M. Baczynski, J. Drewniak, J. Kacprzyk, M. Krawczak, E. Szmidt, M. Wygralak, S. Zadrozny (Eds). Systems Research Institute. ISBN:83-894-7546-4. Volume:1 - Foundations. 31-48.
- [2] Mestre, P., Reigoto, L., Coutinho, L., Correia, A. and Matias, J. e Serôdio, C.. (2013). Calibration Procedures for Indoor Location using Fingerprinting. In *IAENG Transactions on Engineering Technologies*. Gi-Chul and Ao, Sio-long and Gelman, Len (Ed). Springer Netherlands. ISBN: 978-94-007-6189-6. Volume: 229. 349-363. [http://link.springer.com/chapter/10.1007%2F978-94-007-6190-2\\_27](http://link.springer.com/chapter/10.1007%2F978-94-007-6190-2_27)
- [3] Serodio, C., Coutinho, C., Pinto, H., Matias, J. and Mestre, P.. (2013). A Fuzzy Logic Approach to Indoor Location Using Fingerprinting. In *Electrical Engineering and Intelligent Systems*. ISSN:1876-1100. ISBN:978-1-4614-2316-4. Volume:130. 155-169. [http://link.springer.com/chapter/10.1007/978-1-4614-2317-1\\_13](http://link.springer.com/chapter/10.1007/978-1-4614-2317-1_13)
- [4] Guedes, R.; Xavier, J. (2013) Understanding and predicting stiffness in advanced fibereinforced polymer (FRP) composites for structural applications. In *Advanced fibre-reinforced polymer (FRP) composites for structural applications*, ISBN: 0-85709 -418-1.

### 5.3.6.7 Books

- [1] Bento, J., Lousada J. and Teixeira, A. (Ed) (2013). *7º Congresso Florestal Nacional. Livro de Resumos*. ISBN:978-972-99656-3-0. 1-324.

- [2] Bento, J., Lousada, J. and Patrício, M. (Ed) (2013). 7º Congresso Florestal Nacional. Livro de Proceedings de artigos/comunicações. ISBN:978-972-99656-2-3. 1-552.
- [3] Silva M., Dias, A. and Lousada, J. (2013). Madeira de Pinho – Características e Utilização. Tipografia Lessa. ISBN:978-989-704-116-7.

### 5.3.6.8 Completed Masters and Ph.D. Theses

BE researchers supervised a total of 22 completed MSc theses and 4 PhD theses during 2013.

- [1] MSc: Alves, V.F.L. (2013) - Sistema Remoto de Aquisição de Dados para Tratamento de Águas Residuais, Master in Engenharia Electrotécnica e de Computadores, UTAD. Supervisor: Carlos Serôdio (CITAB) and Carla Amaral (CITAB).
- [2] MSc: Branco, N.A.D. (2013) - WSNs pervasivas aplicadas a sistemas de apoio à vida. Master in Engenharia Eletrotécnica e de Computadores, UTAD. Supervisor: Pedro Mestre (CITAB) and Carlos Serôdio (CITAB).
- [3] MSc: Calçada, A.F.C. (2013) - Determinação do Módulo de Elasticidade e Detecção de Defeitos em Peças de Madeira Recorrendo a Ultrassons. Master in Engenharia Eletrotécnica e de Computadores, UTAD. Supervisor: Carlos Serôdio (CITAB) and Pedro Mestre (CITAB).
- [4] MSc: Carvalho, L. (2013) - Otimização do comportamento quase-estático de ligações com transferência de momentos de cavilhas em estruturas de madeira. Master in Engenharia Mecânica, UTAD. Supervisor: Nuno Dourado (CITAB) and Fábio Pereira (CITAB).
- [5] MSc: Carvalho, N.M.M.S. (2013) - Sonda de ultrassons para aplicações agropecuárias. Master in Engenharia Eletrotécnica e de Computadores, UTAD. Supervisor: Pedro Mestre (CITAB) and Pedro Couto (CITAB).
- [6] MSc: Dinis, L.F.C. (2013) - Pastoreio Virtual. Master in Engenharia Eletrotécnica e de Computadores, UTAD. Supervisor: Carlos Serôdio (CITAB) and Pedro Mestre (CITAB).
- [7] MSc: Fonseca, J.P.C. (2013) – Influência dos níveis de atividade física no comportamento biomecânico das forças reativas do apoio durante o caminhar em mulheres pós-menopáusicas. Master in Engenharia Biomédica. Supervisor: João Manuel R. S. Tavares (FEUP) and Ronaldo Gabriel (CITAB).
- [8] MSc: Gonçalves, C.J.C. (2013) - Caracterização da madeira de *Cryptomeria japonica* D.Don. produzida nos Açores. Master in Eng<sup>a</sup> Florestal, UTAD. Supervisor: J. Louzada (CITAB).
- [9] MSc: Guedes, R.M.R. (2013) - Sistema de Detecção e Caracterização de Parques de Estacionamento Exteriores. Master in Engenharia Eletrotécnica e de Computadores, UTAD. Supervisor: Carlos Serôdio (CITAB) and Pedro Mestre (CITAB).

- [10] MSc: Luiz, F.F. (2013). Fratura do tecido ósseo cortical de bovino jovem em modo misto para o ensaio SLB. University of Trás-os-Montes e Alto Douro. Supervisor: Nuno Dourado (CITAB) and José Xavier (CITAB).
- [11] MSc: Madureira, R.C.C. (2013). Portal Biodiversidade de Vila Real. Master in Engenharia Eletrotécnica e de Computadores, UTAD. Supervisor: Pedro Mestre (CITAB) and Carlos Serôdio (CITAB).
- [12] MSc: Malek, N. (2013). Determining radial and tangential shrinkage coefficients of wood by standard and digital image correlation methods, University of Minho. Supervisor: Jorge Branco (UM) and José Xavier (CITAB).
- [13] MSc: Matos, H.T.P. (2013). Detecção de Ligações Clandestinas à Rede de Saneamento. Master in Engenharia Electrotécnica e de Computadores, UTAD. Supervisor: Pedro Mestre (CITAB) and Luís Filipe Sanches Fernandes (CITAB).
- [14] MSc: Meireles, A. J. O. (2013). Efeito de escala em provetes de geometria TDCB: Comportamento da Curva-R e análise assintótica. Master in Engenharia Mecânica, UTAD. Supervisor: Nuno Dourado (CITAB) and José Xavier (CITAB).
- [15] MSc: Monteiro, P.M.F. (2013). Caracterização da madeira de Pinus pinaster à fratura em modo I à escala dos anéis de crescimento, Master in Engenharia Mecânica, UTAD. Supervisor: José Morais (CITAB) and José Xavier (CITAB).
- [16] MSc: Moura, J. (2013). Caracterização de propriedades elásticas da madeira e derivados através do método das grelhas. Master in Engenharia Mecânica, UTAD. Supervisor: José Xavier (CITAB) and José Morais (CITAB).
- [17] MSc: Necho, J. (2013). Fractura em modo misto de ligações coladas em madeira. Master in Engenharia Mecânica, UTAD. Supervisor: José Morais (CITAB) and Nuno Dourado (CITAB).
- [18] MSc: Pereira, M. C. S. (2013). Influência da Composição Corporal nas Forças Reactivas do Solo Durante o Caminhar de Mulheres Pós-Menopáusicas. Master in Podiatria do Exercício Físico e do Desporto. Supervisor: Ronaldo Gabriel (CITAB) and Maria Helena Moreira (UTAD).
- [19] MSc: Pinto, J.C.F. (2013). Portable e-Learning. Master in Engenharia Eletrotécnica e de Computadores, UTAD. Supervisor: Norberto Gonçalves (CITAB) and Pedro Mestre (CITAB).
- [20] MSc: Sequeira, J.E.M. (2013). Sistema de Avaliação da Qualidade em Amostras de Carne. Master in Engenharia Eletrotécnica e de Computadores, UTAD. Supervisor: Pedro Melo Pinto (CITAB) and Carlos Serôdio (CITAB).
- [21] MSc: Vargas, I. Q. (2013). O Efeito de Exercícios do Refomer e Step Chair do Método Pilates na Propriocepção do Tornozelo. Master in Ciências do Desporto – Especialização em Avaliação e Prescrição das Actividades Físicas e Desportivas, UTAD. Supervisor: Ronaldo Gabriel (CITAB).
- [22] MSc: Vaz, L. M. (2013) - Influência de um programa de exercício físico randomizado de 12 meses de intervenção nos sintomas do climatério e na composição corporal de mulheres pós-menopáusicas. Master in Ciências do



Desporto – Especialização em Avaliação e Prescrição das Actividades Físicas e Desportivas, UTAD. Supervisor: Maria Helena Rodrigues Moreira (UTAD) and Ronaldo Gabriel (CITAB).

#### PhD theses

- [1] PhD: Fernandes, M.A. (2013) - O Conceito da Quinta Agrícola sem Fios: Uma Plataforma Multiserviços. PhD in Engenharia Electrotécnica, UTAD. Supervisor: Raul Morais (UTAD) and Carlos Serôdio (CITAB).
- [2] PhD: Pereira, J.L.E. (2013). Assessing wood quality by spatial variability of transverse elastic properties within the stem: Case study on *P. pinaster* at the meso scale. University of Beira Interior. Supervisor: José Xavier (CITAB) and José Lousada (CITAB), Abílio Silva (UBI). (SFRH/PROTEC/50149/2009).
- [3] PhD: Miranda, N.M.F. (2013) - Microssistema de Processamento de sinal para medição de sinais AC em Tecnologia CMOS de Baixo Consumo. Phd in Engenharia Electrotécnica, UTAD. Supervisor: Raul Morais (UTAD) and Carlos Serôdio (CITAB).
- [4] PhD: Santos, C.L. (2013) - Comportamento mecânico de ligações de peças de madeira por cavilha. PhD in Engenharia Mecânica, University of Beira Interior. Supervisor: José Morais (CITAB), Abílio de Jesus (UTAD) and Aurélio Rodrigues Ferreira Reis (UBI).

#### 5.3.6.9 Patents/propotypes

- [1] Ginja, M. Distrator da anca de cães. Provisional Application for National Patent N.º 107372
- [2] Teixeira, C., Bentes, I. Modelo de Avaliação de Desempenho Operacional, Económico e Ambiental de Sistemas de Recolha de Resíduos Urbanos. Provisional Application for National Patent N.º 105741

#### 5.3.6.10 Organization of conferences

- [1] 7º Congresso Florestal Nacional - Universidade de Trás-os-Montes e Alto Douro e Escola Superior Agrária de Bragança, Vila Real/Bragança, 5 a 8 de junho de 2013. Comissão Organizadora e Comissão Executiva. José Lousada.
- [2] 4th International Conference on Integrity, Reliability & Failure (IRF'2013), Funchal, Madeira, Portugal, 23-27 June 2013. Coordenou o Simpósio Especial: CONCRETE MATERIAL PERFORMANCE, em parceria com o Professor Doutor Marcelo de Moura (FEUP). Nuno Dourado.
- [3] 4th International Conference on Integrity, Reliability & Failure (IRF'2013), Funchal, Madeira, Portugal, 23-27 June 2013. Coordenou o Simpósio Especial: MECHANICAL CHARACTERIZATION OF BONE BEHAVIOR em parceria com o Professor Doutor Marcelo de Moura (FEUP). Nuno Dourado.
- [4] Course deliver by Prof. Fabrice Pierron: The Virtual Fields Method- Extracting Constitutive Mechanical Parameters from Full-field Deformation Measurements, University of Trás-os-Montes e Alto Douro, Vila Real, Portugal, 8 July. José Xavier.

- [5] Scientific Committee - International Conference on Computational and Experimental Biomedical Sciences (ICCEBS 2013), 20 a 22 de Outubro de 2013, Ponta Delgada, S. Miguel, Açores, Portugal. Ronaldo Gabriel.
- [6] Scientific Committee - 5º Congresso Nacional de Biomecânica, Portugal (Espinho) de 8 a 9 de Fevereiro de 2013. Ronaldo Gabriel.
- [7] Scientific Committee - International Conference on Sports Science Research and Technology Support (icSPORTS 2013), Portugal (Vilamoura, Algarve) de 20 a 22 de Setembro de 2013. Ronaldo Gabriel.
- [8] Scientific Committee – ICEEE’12 - The 2012 International Conference of Electrical and Electronics Engineering, World Congress on Engineering 2012 (WCE2012), London, United Kingdom, 4 - 6 de Julu 2012. Pedro Mestre.
- [9] Scientific Committee - ICWN’12 - The 2012 International Conference of Electrical and Electronics Engineering, World Congress on Engineering 2012 (WCE2012), London, United Kingdom, 4 - 6 de July 2012. Pedro Mestre.
- [10] Workshop: Bio-based material characterisation from full-field measurements, University of Trás-os-Montes e Alto Douro, Vila Real, Portugal, 9 July. José Xavier.

#### **5.3.6.11 Industry contract research**

N/A

#### **5.3.6.12 Internationalization**

- [1] Research visiting at Lehrstuhl für Carbon Composites in the Technische Universität München, 3-9 March, 2013. Seminar on material parameter characterization from full-field measurements, 6 March. José Xavier.
- [2] Assessing quality of wood and wood products by inverse identification methods based on full-field measurements. COST Young Researchers’ Forum at the FTP-c8 Conference - ‘Young Researchers Direct the Way to Innovation in the Forest-Based Sector’, Barcelona, Spain, 11-13 March, 2013. (Poster Invitation – A total of 180 proposals were received by the Committee and evaluated by a panel of 5 Experts, who have selected 20 proposals to be presented orally and 56 proposals to be presented as posters). José Xavier.
- [3] Meeting at Instituto de Ciencias de la Vid y del Vino for evaluation of the joint research work and possible new projects to be carried out under the Iberoeka framework. Pedro Melo-Pinto.
- [4] 1st International Conference on Natural Fibers: Sustainable Materials for Advanced Applications, University of Minho, Guimarães, Portugal, June 9-11, 2013. (oral presentation). José Xavier.
- [5] Invited Speaker - Technical lecture for students of Postgraduate Forestry Sciences, Universidade Federal do Espírito Santo - UFES, Jerónimo Monteiro (Brasil), 21 de outubro de 2013. José Lousada.

- [6] XII International Conference on Computational Plasticity. Fundamentals and Applications (COMPLAS XII), Mini-Symposium “Multiscale Analysis of Wood and Wooden Structures”, Barcelona, Spain. José Lousada.
- [7] 4th International Conference on INTEGRITY, RELIABILITY & FAILURE, Funchal (Portugal), 23-27 June 2013. José Lousada.
- [8] The World Congress on Engineering (WCE2013). Pedro Mestre.
- [9] Meeting with Giara group from the preparation of a PhD Program proposal. Pedro Melo-Pinto.

### 5.3.6.13 Government/Organization contract

N/A

### 5.3.6.14 Awards

- [1] Best Paper Award: The 2013 International Conference of Wireless Networks: P. Mestre, R. Guedes, P. Couto, J. Matias, J. Fernandes, Serodio, C., "Vehicle Detection for Outdoor Car Parks using IEEE802.15.4", The World Congress on Engineering 2012, London, United Kingdom, 4-6 de July, 2013.
- [2] Best Poster Award: XXXVII Jornadas Médico-Veterinárias da AEFMV, 15 a 17 de novembro de 2013, Lisboa, Portugal Trabalho: “Cachorro bulldogue francês com espinha bífida - Resumo de caso clínico”. Autores: J. Leite, J. Bordelo, A. Cálix, M. Dia

## 5.3.7 Future research

### 5.3.7.1 Objectives

#### Project #1 Bio-based materials

**Task #1.01 - Mechanical behaviour of bio-based materials (wood and bone):** Several tests will be run to test the new data reduction strategy previous proposed for characterising wood at the growth ring scale, taking into accounts both orthotropy and heterogeneity. A single heterogeneous plate bending test which was proposed for characterising clear wood by the deflectometry technique will be further tested. It will be pursued the complete mechanical characterisation of cortical bone tissues, coupling digital image correlation with several test methods. Finally, the integrated toolboxes of white-light optical methods, namely, digital image correlation, grid method/deflectometry and feature-tracking method will be developed.

**Task #1.02 - Fracture behaviour of bio-based materials (wood and bone) and structures:** The determination of cohesive laws in wood bonded joints involves the application of a direct method or an inverse approach, which is associated to an optimization strategy. Through the first planned activity, the determination of the crack opening displacement is required. The digital image technique is envisaged for this purpose. In the second planned activity, a genetic algorithm combined with the finite element method is needed. The characterization of wood-steel dowelled-joints,

wood repairs and metal fixations for bone repair will be performed experimentally using the digital image technique.

**Task #1.03 – Bio-based fibre and particle composites:** Wood can be mixed with other products incorporating co-products, agro-forestry wastes and other biological materials, with significant environmental & economic benefits. This task intends to continue with the characterisation of these products incorporating alternative materials. Novel approaches are proposed for a robust evaluation.

## **Project #2 Image-based systems**

**Task #2.01 Image-based classification using computational intelligence techniques:** Soft Computing techniques will be applied in image classification problems, for agricultural, forestry, environmental and biological systems, providing a way to incorporate the intrinsic ambiguity and complexity in the methodologies. The complexity involved in these kind of multi-tracking problems is huge and we aim to soften that complexity by introducing necessary flexibility while maintaining accuracy, to deal with the uncertainties (occlusions, misdetections, etc.) using the above mentioned techniques. Robust methodologies will be developed for feature tracking in image sequences using FSs concepts along with feature behavioral characterization methodologies for feature identification and tracking. Application of classification methodologies based on statistical and textural measures, FSs concepts and its extensions for meat quality assessment and characterization.

**Task #2.02 Hyperspectral imaging techniques for agro-forestry, environment and biology:** Hyperspectral imaging will continue to be used for non-destructive analysis of biological materials, namely vine and grapes. Advanced machine learning algorithms will continue to be developed to extract from hyperspectral information the values of parameters to be measured.

**Task #2.03 Imaging techniques as a tool to improve biological models:** This task employs biomechanical and environmental analysis, using computer assisted imaging techniques, to assess the quality and type of the movement in biological models, such as plantar pressure abnormalities- development of a methodology to determine local (over)loading of the plantar surface, biomechanical load over walking trails, and the development of methodologies to improve radiographic and ultrasound imaging diagnosis.

**Task #2.04 - Device-independent image visualization techniques and data transmission:** This task aims to study, model and develop Embedded Systems and WSNs to characterize and perform automatic control over activities (design of devices) related with agro-food environments, including the development of embedded communication protocols and instrumentation (sensor) systems for precision agriculture and food quality evaluation applications.

## 6 Unit Composition (2013)

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#### VICE-DIRECTOR

Pedro José de Melo Teixeira Pinto

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Samantha Jane Hughes

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Alberto Carlos Pires Dias  
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Luis Filipe Sanches Fernandes

### MANAGEMENT & COMMUNICATION OFFICE

Lígia Azevedo Ribeiro Pinto  
Ana Sofia Romão de Oliveira Moura

**SUSTAINABLE AGRO-FOOD CHAINS****PRINCIPAL INVESTIGATOR**

Francisco Manuel Pereira Peixoto

**INTEGRATED/FULL MEMBER (PH.D.)**

Alberto Dias	Changhe Zhang	Hernâni Varanda Gerós
Alfredo Aires	Cristina Aguiar	João Carlos Santos
Amélia Silva	Cristina Pereira Wilson	João Paulo Moura
Ana Alexandra Oliveira	Cristina Andrade	Jorge Ventura Cardoso
Ana Cristina Cunha	Cristóvão Lima	José Gomes Laranjo
Ana Isabel Barros	Dario Santos	José Luís Pereira
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Anabela Afonso Silva	Ester Portela	Manuel F. Ferreira
Armindo A. Martins	Eunice Bacelar	Maria Solange Leite
Artur Conde	Fernanda Ferreira	Olga Coutinho
Aureliano Malheiro	Fernando Raimundo	Paula Cristina Oliveira
Berta Gonçalves	Francisco Peixoto	Piebiep Goufo
Carlos Venâncio	Franklin Gregory	Raúl Domínguez Perles
Carlos Manuel Correia	Henrique Trindade	Rui Pedro Oliveira

**OTHER RESEARCHERS IN THE GROUP (PH.D.)**

Ana Lúcia Sintra	João Paulo Carneiro	Manuel Teles Oliveira
Ana M <sup>a</sup> . Nazaré Pereira	Luís Jesus Rivas Soriano	Paula Alexandra Oliveira
Bruno Colaço	Luis Marques Antunes	Regina Arantes
Clemente Sanchez	M <sup>a</sup> Carmo Vasconcelos	Teresa Pinto
Fernando Davila	Maria do Rosário Anjos	Vicente de Seixas e Sousa
Isabel Pinto Mina	Maria Isabel Cortez	
João Corte-Real	Maria João Pires	

**OTHER RESEARCHERS IN THE GROUP (NON PH.D.)**

Ana Isabel Oliveira	Helena Maria Ferreira	Rose Marie Sousa
António José Nogueira	Maria José S.P. Correia	
Cláudia Marta Pinho	Nuno Miguel Santos	

**TRAINING**

Ana Cristina Carvalho	Ermelinda Isabel Silva
André Miguel Pinho Moreira	Hélder Fraga
António da Costa Teixeira	Henrique Luis Silva de Noronha
Carlos Rochinha	Irene Gouvinhas
Carla Sofia Dias	Manuela Andreia Carneiro
Cátia Vanessa Brito	Maria Adelaide Perdigão
Cátia Inês Santos	Maria Margarida Mota
Dário Lúcio de Jesus	Marta Cardoso

Marslin Gregory  
Maxwell Owusu-Twun  
Sofia Mendes Correia

Richard Maykel Gonçalves Breia  
Viviana Varajão Martins

### **AGROBIOPLANT RESEARCHERS**

#### **RESEARCHERS IN THE GROUP (PH.D.)**

Alberto Carlos Pires Dias  
Ana Cristina Gomes da Cunha  
Artur Jorge da Silva Conde  
Cristina Alexandra de Almeida Aguiar  
Cristina Maria Pereira Wilson

Cristóvão Fernando Macedo Lima  
Franklin Gregory  
Hernâni Varanda Gerós  
Olga Maria Fernandes Pereira Coutinho

#### **OTHER RESEARCHERS IN THE GROUP (PH.D.)**

Isabel Maria Cravo Aguiar Pinto Mina

#### **OTHER RESEARCHERS IN THE GROUP (NON PH.D.)**

Ana Isabel de Oliveira  
Cláudia Marta Pinho

Rose Marie Oliveira Ferreira de Sousa

#### **TRAINING**

Ana Cristina Pontes Carvalho  
André Miguel Pinho Moreira  
António da Costa Teixeira  
Henrique Luis Silva de Noronha

Marslin Gregory  
Richard Maykel Gonçalves Breia  
Viviana Varajão Martins

**ECOINTEGRITY****PRINCIPAL INVESTIGATOR**

Mário Gabriel Santiago dos Santos

**INTEGRATED/FULL MEMBER (Ph.D.)**

Ana Cristina Sampaio  
 Ana Maria Paiva Coimbra  
 António Fontainhas Fernandes  
 António Luís Crespi  
 Edna Carla da Câmara Sampaio  
 Guilhermina da Silva Marques  
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 Luís Filipe Sanches Fernandes  
 Mário Gabriel Santos  
 Mário Jorge M. Gonzalez Pereira  
 Paula Maria Seixas Arnaldo  
 Paulo Alexandre Fernandes  
 Rui Manuel Furtado Bezerra  
 Rui Manuel Vitor Cortes  
 Samantha Jane Hughes  
 Sandra Mariza Monteiro  
 Simone da Graça Varandas

**OTHER RESEARCHERS IN THE GROUP (Ph.D)**

António Joaquim Matos  
 Aurora Carmen Monzón Capapé  
 Carla Maria Amaral Marinho  
 Carlos Gonçalves Rossa

Carmen Hernandez Gómez  
 Felisbina Luisa Guedes Queiroga  
 João Manuel Oliveira  
 João Paulo Fidalgo Carvalho  
 Luis Miguel Ferreira Pontes Martins

**OTHER RESEARCHERS IN THE GROUP (non Ph.D.)**

Anabela Nave Rodrigues  
 Carlos Alberto Loureiro da Silva  
 Cristina Conceição Ribeiro Carlos  
 Frederico Meireles Alves Rodrigues  
 Hélia Marisa do Vale Gonçalves  
 Joaquim José Barreira de Jesus  
 Leónia do Carmo Santos Nunes  
 Luís Filipe Roxo de Almeida  
 Luis Pedro Mendes Freitas

Maria da Conceição Carvalho Rodrigues  
 Maria Irene Fraga dos Santos  
 Marta Couto Ferreira  
 Paula Alexandra Botelho Pinto  
 Rita Coelho Bastos  
 Regina Santos  
 Sandra Liliana Cardoso Costa  
 Sara Carvalhinho Rodrigues

**TRAINING**

Ana Catarina Gonçalves Luzio  
 Ana Lúcia Pereira Pinto  
 Anabela Cristina Nave Rodrigues  
 Anita Isabel Ferreira da Costa Pinto  
 Francisco José Guedes Morinha  
 Lav Sharma

Maria Inês de Almeida Páscoa  
 Marisa de Oliveira Lopes  
 Sandra Isabel Ribeiro Pereira  
 Sofia Gabriel Garcia Santos  
 Vitor Rodrigues Pereira



**BIOSYSTEMS ENGINEERING****PRINCIPAL INVESTIGATOR**

José Luís Penetra Cerqueira Lousada

**INTEGRATED/FULL MEMBER (Ph.D.)**

Carlos Manuel José Alves Serôdio  
Cristóvão Lucas dos Santos  
Irene Cristina Salgueiro de Oliveira  
João Luis Pereira  
José Joaquim Lopes Morais  
José Luís Penetra Cerqueira Lousada  
José Manuel Cardoso Xavier

Mário Manuel Dinis Ginja  
Nuno Miguel Magalhães Dourado  
Pedro Alexandre Mogadouro do Couto  
Pedro José de Melo Teixeira Pinto  
Pedro Miguel Mestre Alves da Silva  
Ronaldo Eugénio Calcada Dias Gabriel

**OTHER RESEARCHERS IN THE GROUP (Ph.D.)**

Alfredo Balacó de Morais  
Amadeu Duarte da Silva Borges  
António Manuel Ribeiro de Sousa  
Armando Soares  
Carlos Afonso de Moura Teixeira  
Eliseu Leandro Magalhães Monteiro  
José Carlos Silva Cardoso  
José Manuel Alves Ribeiro

Marco Paulo Duarte Naia  
Maria Emilia Calvão Moreira da Silva  
Maria Eunice da Costa Salavessa  
Maria Isabel Ribeiro Dias  
Norberto Jorge Gonçalves  
Nuno Manuel Lucas Vieira Lopes  
Nuno Paulo Correia e Afonso Moreira  
Paulo Alexandre Cardoso Salgado

**OTHER RESEARCHERS IN THE GROUP (non Ph.D.)**

Alexandra Luísa Ribeiro Dias  
Carlos Filipe Rompante da Cunha  
David Neves Silva  
Florabela Rocha Aragão  
Hugo Daniel Pinto da Silva

João Manuel Cardoso Martins  
João Paulo Coelho  
Pedro Manuel da Conceição Custódio  
Telmo Dias Bento  
Valeria Reva

**TRAINING**

Fábio André Magalhães Pereira  
Fawad Mazhar

Jorge Marcelo Quintas de Oliveira