

ACTIVITIES REPORT 2019

Centre for the Research and Technology of Agro-Environmental and Biological Sciences





Compiled and edited by CITAB Executive Committee and Lígia Pinto



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19 Internacional **48** National



with stakeholders **1.3M€** fundamental science **2.7M€**

97 Full Members **201** Collaborators



44% Men 56% Women



201 JCR/Scopus papers 20 Books & Chapters 324 Others



3 International **1** National



CITAB's 2019 Activities Report presents the main activities made during the transition year between the late Pluriannual Strategic Plan 2015-2018 and the new Strategic Plan 2020-2023.

The Centre shows continuing success in the accomplishment of the Strategic Plans, levels of scientific productivity and participation in national and international projects and doctoral programmes and continues to strenghten the links with stakeholders and strategically important partners (INESC-TEC and CIIMAR).

The Centre's strategic mission is to create opportunities for stakeholders through scientific and technological innovation in agro-food and forestry chains that support environmental sustainability.

CITAB received 200K€ from FCT funding in 2019 and researchers continue to search and apply for external funding from national and European project calls and consultation with private and public sector stakeholders, raising a total of 4M€. The strategic partnership formed with INESC-TEC and CIIMAR promoting synergies on key common research areas resulted on the organization of two international events: the "Digital Agro-food & Forestry (r)evolution Congress" and the "Workshop From the Stream to the Coast: valuing ecosystem services to promote the sustainable development of river basins". Two other events were organized under CITAB running projects: "Clim4Vitis Conference - Evaluating the impact of climate change on viticulture" on the Twinning project Clim4Vitis and the "4th INTERACT Conference - Challenges for rural territories in Trás-os-Montes and Alto Douro".

This report highlights for 2019: the participation on 67 projects; the production of 545 research outputs (including 201 peer reviewed manuscripts); the participation on several outreach activities and the first PhD Doctorates, including European Doctorates, from the PhD programmes "AgriChains" and "Do*Mar".

CITAB activities focus on interdisciplinary research on agro-food and forestry systems using the production-chain approach as a whole.

To address the increased scientific challenges and more complex situations, CITAB gathered a team of multidisciplinary expertise ranging from fundamental sciences such as biology and chemistry to agronomists, forestry engineers and ecologists. The group benefits from the input of other scientific experts in the fields of mathematics, physics, technological engineering and engineers.

The novelty of CITAB relies exactly on the integrated research of this expertise fostered by an international cooperation, which is able to emerge with smart and sustainable agroforestry innovative solutions to create higher added value in the agri-food and forestry production chains.



CITAB is in tune with the major trends in the search for solutions for a sustainable future – tackle the climate crisis and the nature regeneration. Today, solutions must be sought that support the food systems transformation as well to support a circular bioeconomy to provide renewable and sustainable alternatives to fossil fuel-based materials and the development of a nature-based economy.

Luís Rochartre, World Business Council for Sustaintable Developement

World is facing increasing challenges which have been addressed in recent events (i.e. The Paris Accord of 2015, the adoption of the 2030 Agenda of the UN with 17 SDGs, the update in 2018 of the EU Bioeconomy), calling the attention for urgent action from both politicians and society, to seek solutions, for a more sustainable planet whilst feeding the raise of population suffering from hunger (albeit the complex panoply of situations). CITAB is conscious of this critical reality and is directed to a pragmatic and fast integrated research and innovation approach in a close cooperation with stakeholders, lato sensu.

Eduardo Rosa, former CITAB's Director



MISSION

CITAB is committed to collaborating and consulting stakeholders to understand their needs, problems and constraints. We use multidisciplinarity and innovation to reply to those needs, resulting in more competitive value chains, a better and sustainable environment and more developed societal knowledge.

VISION

Address stakeholders needs and contribute to the national economy, by innovative science and technology, and higher inputs efficiency to improve the competitiveness and sustainability in agriculture and forestry production chains.

STRUCTURE & RESEARCH LINES



Concerning its organizational structure, CITAB applies a "bottom-up" management approach. The **Directorate**, composed by one Director and two Vice-Directors, is supported by an **Executive Committee**, consisting of seven members from the different research tasks, which forms a dynamic two-way link between members and the Directorate for strategy development, progress checking and decision-making. All strategic issues are discussed and voted on by the **Scientific Council** (members with PhD and meeting regulations concerning publishing criteria), which meets a minimum of 4 times a year.

A dedicated **Management Office** handles the financial and administrative issues of the Centre, as well as the AgriChains FCT funded international doctoral programme, and supports the organization of national and international scientific events and outreach activities, liaises with UTAD administrative sections and assists the Board, Thematic Line coordinators, Tasks and the Executive Committee.

CITAB also has an **External Advisory Committee**, comprising three internationally recognized experts that make objective critical analyses of the unit's R&D activities and performance to provide recommendations. Additionally, the Centre relies on the advice of a **Stakeholders** Committee, which includes key stakeholders from the private and public sector and meets with CITAB members, the Directorate and Executive Committee periodically, to assess overall results and activities and lay down guidelines for the future.

THEMATIC RESEARCH LINES & TASKS

CITAB research activity is characterised by a streamlined approach, focused into two thematic lines that contribute to resolving societal and private sector issues in agriculture and forestry production chains and their impact on the natural environment: "Sustainability of Agri-food and Forestry Ecosystems in a Changing Environment"; and "Technology & innovation in Agri-food and Forestry chains for a more competitive bioeconomy". This structure aims to balance scientific excellence with benefits and consequences across multiple dimensions that embrace environmental sciences and socioeconomic needs.



1-Sustainability of Agri-food and Forestry Ecosystems in a Changing Environment

Thematic Line "Sustainability of Agri-food and Forestry Ecosystems in a Changing Environment" (TL1) aims to monitor and assess how different types and scales of impacts affect agri-food and forestry chains systems, biodiversity and ecosystem services. It applies multidisciplinary research to develop integrated tools and methodologies to monitor how multiple scale impacts affect ecosystems and biodiversity. Activities in TL1 are focused into two Tasks: Task 1.1. Integrated monitoring of climate and environmental impacts and Task 1.2. Sustainability in agri-food and forestry ecosystems.

Task 1.1 is highly interdisciplinary, using field, laboratory and computational techniques, advanced analysis, scaling and modelling tools and testing novel potential indicators of change. This task aims to (i) develop and apply new analytical technologies to (ii) understand climatic and environmental forcing on target ecosystems under current conditions; (iii) assess current and future scenarios of climate and environmental change to develop, test and implement suitable mitigation and adaptation measures, such as riparian restoration or bioclimatic cultivar adaptation.

Task 1.2 gathers multidisciplinary researcher in multivariate analysis and modelling of impacts of habitat and land use change on terrestrial and aquatic environments, ecosystem services and characterization of agri-food and forestry systems.

2 - Technology & innovation in Agri-food and Forestry chains for a more competitive bioeconomy

Thematic Line "Technology & innovation in Agri-food and Forestry chains for a more competitive bioeconomy " (TL2) aims to use innovation to strengthen sector competitiveness by improving and expanding the potential range of agro-food and forestry products on offer. By promoting recycling, reuse and recovery of raw materials, TL2 brings added-value to agri-forestry ecosystems, agri-food and forestry products and coproducts, by boosting both regional and national economic growth. TL2 directly involves sector stakeholders throughout the 2 vertically structured Tasks applying multidisciplinary research: Task 2.1. Innovative technologies and processes and Task 2.2. Valorisation of bio-based products and co-products.

Task 2.1 promotes the optimization and development of innovative technology to the agri-food and forestry production chains, boosting competitiveness and income by improving food and forestry crop productivity, reducing management costs and increasing profit.

Task 2.2 research aims to uncover the potential of agri-food and forestry products and residues, including native flora and aromatic and medicinal plants to develop new high bio-based value products.





CITAB achievements are geared to meet regional and national stakeholder needs and have been oriented to fit in the four Research Tasks.

Task 1.1

Integrated monitoring of climate and environmental impacts: daptation and mitigation strategies

Application of innovative downscaling methodologies and development of climate change projections for heatwaves, droughts, hail, agro-climatic and environmental indices. Development of models for the allocation of rainwater harvesting systems on agroforestry applications, evaluating the risk of aquifer contamination. Development of new mitigation measures related to river damming. Application of distinct levels of biological organization to assess the environmental quality of water resources. Evaluation of microplastics toxicity in

aquatic organisms. Use of gill histopathological responses as biomarkers of environmental disturbance. Quantification of the longevity of fuel hazard-reduction treatments in mitigating wildfire severity in pine forest.

Task 1.2

Sustainability in agri-food and forestry ecosystems

Innovative studies on pre-treatments for enhancement of olive tree drought adaptability; sustained deficit irrigation of olive tree for higher water productivity and the accumulation of oil and phenolic compounds in fruits. Mycoemediation of wastes and evaluation of wastewaters toxicity from Mediterranean agro industries using a multi-organism approach. Establishment/improvement of the classification criteria for Portuguese rivers (physical-chemical and hydromorphological quality) and development of tools for hierarchical decision-support framework for dam removal. Application of new concepts of spatial planning by using multi-modelling frameworks to support decision-making from local biodiversity management to landscape planning and definition of the no go areas for protection of endangered species.

Task 2.1

Innovative technologies and processes

Development of oenological parameter prediction models, using data from hyperspectral imaging of local grape varieties. Deployment of a new deep learning model (combining machine learning regression) for sugar content determination. A similar grape variety (and clones) multi class discrimination approach was assessed as an alternative to ampelography, isozyme and DNA analysis. Development of biofertilizers for legumes based in plant growth promoting

> rhizobacteria (PGPR), including rhizobia, and arbuscular mycorrhizal fungi (AMF). A national patent application regarding the use of the selected microorganisms as biofertilizers was submitted and the approval is pending. Software development and decision support for medical imaging analysis and orthopaedic surgery planning. Medical devices to proper musculoskeletal morphological assessment without human exposure to ionizing radiation were developed.

Task 2.2

Valorization of bio-based products and co-products

Contributing to the problematic of multidrug-resistant bacteria, methanol and aqueous extracts of Shiitake mushroom have shown to have significant antimicrobial and antioxidant activities. Studies performed with thymus and gingko leafs extracts have also pointed out a relevant antimicrobial activity and an hepatoprotective effect. Lyophilized broccolis

were successfully used as a gelatin matrix in pellets, using mice as the animal model to refine pharmaceutical drugs oral dosage. In partnership with the pharmaceutical industry, novel products from the agrifood sector were evaluated/developed leading to development of anti-aging composites. Following a Zero Waste strategy, these products and the resulting residues were successfully tested as animal feeds for rabbits.

COMPETITIVE FUNDING & RESEARCH PROJECTS

During 2019, 32% of the Centre's funding was assigned to research and innovation projects in partnership with stakeholders (private and public), strengthening our position as a key partner of the industry, in the quality of research provider. CITAB's Laboratories of Applied Ecology (LEA) and Fuvial Ecology (LEF) played a major role attracting most of these investments.

The European funded projects, from HORIZON 2020 and INTERREG programmes, represented 18% of the competitive funding, standing out the coordination of the Twinning project "Clim4Vitis –Climate change impact mitigation for European viticulture: knowledge transfer for an integrated pproach", funded with 374K€ by the European Commission.

In total, CITAB researchers were awarded a sum of **4M€** from different funding entities in 2019, participating in **19** international projects and **48** national R&D projects.



H2020 PROGRAMME





CLIM4VITIS



Climate change impact mitigation for European viticulture: knowledge transfer for an integrated approach

Start date: September 2018 Duration: 36 months

Although among the top 10 Portuguese universities with higher number of top quality scientific papers published, and despite the growing attractiveness that it has been gaining in terms of research and teaching, UTAD is still far from the European high performing R&D institutions. Thus, the Clim4Vitis project, a Coordination and Support Action, funded with 1 million euros by the EU Horizon 2020, aims at enhancing UTAD's Scientific & Technologic capacity, as well as raising its staff's research profile, specially focusing one of the fields of research in which the University has become a national reference: viticulture. Within this broad area, particular attention should be given to two main lines of research: Grapevine modelling and Tools for assessing climate change impacts on European viticulture, in general, and on grapevine productivity, quality attributes and risk of diseases and pests in particular. In order to boost competences in these topics, the project gathers 5 international partners: UTAD, as Coordinator Institution; Potsdam Institut fuer Klimafolgenforschung (PIK); Universita degli studi di Firenze (UNIFI); Luxembourg Institute of Science and Technology (LIST); and Sociedade Portuguesa de Inovação (SPI).

Clim4*itis

Principal Investigator at CITAB: João Santos (Consortium Coordinator) Leader Institution: University of Trás-os-Montes and Alto Douro (PT) Web site: https://clim4vitis.eu/ Funded under: H2020 Spreading Excellence and Widening Participation programme

H2020 PROGRAMME



Training the next generation of integrated fire management experts

Start date: October 2019 Duration: 48 months

PyroLife is an Innovative Training Network bringing together universities, research institutes, forest and fire management agencies, public companies, SMEs, emergency services and NGOs across the world to train 15 PhD students to pursue cross-disciplinary, wildfire-focused projects. The aim for the projects is to aid in facilitating the advancement of holistic, integrated wildfire management. For its participants, PyroLife focuses on incorporating diverse backgrounds that may promote creativity for innovative wildfire strategies. Southern European leadership in fire expertise will be used to understand and predict wildfires in Northern Europe, whilst Northern European lessons learned in the prevention of floods will be applied in Southern Europe. A key goal of the initiative is to instill intersectional, transferable knowledge and maximize employability for its graduates. PyroLife is a novel facet in the global wildfire network and may bring innovative ideas from a wide range of fields during a critical time in wildland fire research.



Principal Investigator at CITAB: Paulo Fernandes Leader Institution: Wageningen University (NL) Web site: https://pyrolife.lessonsonfire.eu Funded under: H2020 Marie Skłodowska-Curie Innovative Training Networks



PYROLIFE







Breeding for Resilient, Efficient and Sustainable Organic Vegetable production

Start date: May 2018 Duration: 48 months

BRESOV project deals with the urgent need to provide climate-resilient cultivars addressed to organic vegetable production systems. These new cultivars will benefit organic growers, and the organic seed industry, providing much needed security both under current and future scenarios of climate change. BRESOV works on broccoli, snap bean and tomato as those staple vegetable crops have significant roles in meeting our global food and nutritional security goal, and under organic conditions can contribute to storing carbon and introducing nitrogen improving organic soil quality. The project aims to implement the resilience, efficiency and sustainability of organic vegetable production not only by exploitation the wide agrobiodiversity, which is until now not well utilised for broccoli, snap beans and tomato, but also to adapt them to the innovative organic protocols supported by the use of bio-stimulants and natural bioactive compounds. BRESOV involves 22 partner institutions from ten European countries as well as China, Tunisia and South Korea and is characterised by a multi-actor approach placing special emphasis on the input and needs of the breeding and farming sector.



Principal Investigator at CITAB: Eduardo Rosa Leader Institution: University Degli Studi Di Catania (IT) Web site: https://bresov.eu Funded under: H2020 Sustainable Food Security programme

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Propagating innovations for more resilient dairy farming in the Atlantic area

Start date: January 2018 Duration: 48 months

The Dairy4Future (D4F) project aims to increase the competitiveness, sustainability and resilience of dairy farms in the Atlantic area. In this project, Portugal is divided in two regions (North and Centre and South and Azores) and CITAB's team is responsible for collecting data from eighteen pilot farms in the regions of North and Centre of Portugal. Its objective is to identify, evaluate and then widely propagate innovative practices to European dairy technicians and breeders, through transnational seminars or farm open days. The project puts innovative farmers at the centre of practice-based research work and combine several methods (SWOT analysis, research activities, and economic simulation) to adapt and develop scientific knowledge, which will lead on technical solutions and recommendations to be shared across the network.

D4F project involves 5 countries (Portugal, Spain, France, United Kingdom and Ireland) and covers, from Scotland to Azores, 12 Atlantic regions that together represent 20% of EU-28 milk production and 100 000 farmers working in a wide diversity of milk production systems.



Principal Investigator at CITAB: Henrique Trindade Leader Institution: Institut de l'Elevage (FR) Web site: https://dairy4future.eu Funded under: INTERREG Atlantic Area programme







TRIPLE-C

Capitalising climate change projects in risk management for a better Atlantic Area resilience

Start date: April 2019 Duration: 36 months

CITAB is a partner of the INTERREG Atlantic Area project TRIPLE-C "Capitalising Climate Change projects in Risk management for a better Atlantic Area resilience" in a partnership with 7 institutions: Association Climatologique de la Moyenne-Garonne et du Sud-Ouest; Chambre & Agriculture de la Dordogne; Instituto Vasco de Investigación y Desarrollo Agrario S.A.; Westcountry Rivers Trust; Limerick Institute of Technology; Universidade de Coimbra and Universidade de Trás-os-Monte e Alto Douro. Triple-C is conceived as a capitalization initiative focused on the analysis, evaluation and exploitation of best EU projects on the prevention and management of risks deriving from climate change. The project partners will collaborate to disseminate and transfer the best practices and results identified in this domain with the final aim of mainstreaming into policymaking. Coordinated by Ronaldo Gabriel, CITAB's team is focused on the development of contributions based on "Nature and Health Promotion to Face Climate Change".

Principal Investigator at CITAB: Ronaldo Gabriel Leader Institution: Association Climatologique de la Moyenne-Garonne et du Sud-Ouest (FR) Web site: https://www.triplecproject.eu/ Funded under: INTERREG Atlantic Area programme



Improving the management of Atlantic Landscapes: accounting for biodiversity and ecosystem services

Start date: November 2017 Duration: 36 months

ALICE is a project funded by the European Regional Development Fund under the umbrella of INTERREG Atlantic Area with 11 partners involved in the project, from Portugal, Spain, Northern Ireland, France and the United Kingdom. The three-year project started in November 2017 will cost 3 million euros with 25% covered by the beneficiary partners.

The main goal is to promote sustainable investments in Blue-Green Infrastructure Networks through identification of the benefits of Ecosystem Services delivered at the terrestrial-aquatic and land-sea interface in the Atlantic Region.

ALICE will also identify economic and social barriers to the implementation of Blue-Green Infrastructure Networks in each of the four case studies of the project and it will provide robust scientific, socioeconomic and environmental policy support for the effective implementation of future BGINs. The team includes scientists, universities, research institutes, local and national governments, NGOs and SMEs.



Principal Investigator at CITAB: Edna Cabecinha Sampaio Leader Institution: University of Cantabria (SP) Web site: https://project-alice.com Funded under: INTERREG Atlantic Area programme



TRANSNATIONAL COOPERATION – INTERREG PROGRAMME





TURBO-SUDOE

Development, validation and demonstration of a model based on a network of 'Transference Brokers' for a direct technology transference between R&D centres and companies in the SUDOE territory

Start date: July 2016 Duration: 36 months

TURBO-SUDOE gathers 5 centres offering knowledge on the one hand (4 universities), and 3 business associations demanding technology in 3 strategic sectors of SUDOE territory, such as agrifood, automotive and energy/ICTs (crosscutting). KIMBcn, global expert in training and technology transfer, completes the consortium. They all face a common challenge: improving the transference processes in order to facilitate the market exploitation of the knowledge generated in the SUDOE regions, stimulating the involvement of the private sector through the full alignment of the R & amp; D (offer) with the business activities (demand). The main objective is to act in this research-market interface and make this transfer effective and sustainable through the design, validation and demonstration of a novel role that will act as a bridge and a dynamizer between them: the Transference Broker. The innovative approach of the project lies in its demonstration in a real environment, which will be developed on three strategic sectors for the SUDOE territory and for the RIS3 strategies of the regions, facilitating its replicability.

Principal Investigator at CITAB: Eduardo Rosa Leader Institution: University of Burgos (SP) Web site: https://www.turbo-sudoe.eu/ Funded under: INTERREG SUDOE programme



Cooperative research network in the field of polyphenols and their industrial applications

Start date: October 2015 Duration: 51 months

IBERPHENOL establishes a thematic research network on polyphenols, promoting the integration of research and development capacities, as well as training and mobility of researchers between academic centres and companies. It also promotes collaborative R & D projects and the transfer of technology between public institutions and the business environment.

The project was born from the University of Salamanca's idea of enhance the research that had been ongoing for several years in the working group GIP (Polyphenol Research Group of University of Salamanca). The GIP had stable collaborations in place with the rest of the members included in this consortium. With the aim of strengthening these connections and pursuing goals far more ambitious than those so far carried out, the network Iberphenol was set out as the Iberian Polyphenol Research Network.



IBERPHENOL





Principal Investigator at CITAB: Eduardo Rosa Leader Institution: University of Salamanca (SP) Web site: https://iberphenol.eu/ Funded under: INTERREG POCTEP programme

COST ACTIONS





INTEGRAPE



Data integration to maximise the power of omics for grapevine improvement

Start date: September 2018 Duration: 48 months

The COST Action INTEGRAPE will bring together all stakeholders in the grapevine research community (academic, industry, policymakers and consumers) in an open, international, and representative network to develop minimal data standards and good practices in order to integrate data repositories and improve interoperability between datasets. The ultimate objective is to harness and exploit all available data to achieve better management practices and more cost-effective breeding for improved genotypes.

The concepts described will support stakeholders by developing innovative strategies to integrate grapevine data from existing resources and new experiments in a cost-effective manner, as well as making interoperable grapevine datasets and tools available in a secure and standardised format.



Participant Investigators from CITAB: Ana Barros, José Moutinho Pereira, Hernâni Gerós & Artur Conde Leader Institution: Università degli Studi di Verona (It) Web site: http://www.integrape.eu/ Funded under: COST ACTION programme





Fire in the Earth System: Science & Society

Start date: April 2019 Duration: 48 months

FIRElinks will develop the EU-spanning network of scientists and practitioners involved in forest fire research and land management with backgrounds such as fire dynamics, fire risk management, fire effects on vegetation, fauna, soil and water, and socio-economic, historical, geographical, political perception and land management approaches. It will connect communities from different scientific and geographic backgrounds, allowing the discussion of different experiences and the emergence of new approaches to fire research. The main aim of FIRElinks is to power synergistic collaborations between European research groups and stakeholders with the objective to synthesise the existing knowledge and expertise, and to define a concerted research agenda which promotes an integrated approach to create fire-resilient landscapes, taking into account biological, biochemical and-physical, but also socio-economic, historical, geographical, sociological, perception and policy constraints. This is an urgent societal need due to expected further intensification and geographical spreading of wildfire regimes under Global Change.



Principal Investigator at CITAB: Mário Gonzalez Pereira Leader Institution: University of Valencia (SP) Web site: https://www.firelinks.eu/ Funded under: COST ACTION programme



FIRELINKS



COLLABORATIVE LABORATORIES





Collaborative Laboratory for Innovation in the Food Industry

Start date: April 2019 Duration: 36 months

The CoLab4Food aims to promote a paradigm change in the collaboration framework between stakeholders from the food sector. It will act as a process that flows from the business sector to the non-business entities of the research and innovation system. While business-related entities play a leading role during this process, the R&I system will be active in order to meet the needs and expectations of the food sector, providing scientific and technological competences to solve large-scale problems. The consortium comprises 15 institutions including main national universities, R&D centres, including researchers from CITAB/UTAD, and main stakeholders of the food sector, such as PortugalFoods and the Sumol-Compal and Super Bock groups. At the end of the process, CoLab4Food intend to be the reference platform for collaborative innovation and knowledge transfer in the national agri-food sector and to represent Portugal in the innovation ecosystem of the global agri-food sector.

Its mission is to be a catalyst for innovation focused on the needs of the consumer and the Agro-Food industry, through collaborative research and by transference of knowledge and creating high-qualified jobs.



Principal Investigator at CITAB: Ana Barros Leader Institution: Associação Integralar - Internvenção de Excelência no Setor Agroalimentar (PT) Web site: https://colab4food.com/ Funded under: NORTE2020 programme



COLLABORATIVE LABORATORIES

Collaborative Laboratory for Integrated Forest & Fire Management

Start date: September 2019 Duration: 36 months

CoLAB ForestWISE is a collaborative laboratory "for forest and integrated fire management, with emphasis on knowledge transfer that brings together the multiple interdisciplinary areas that are relevant for building up a holistic and cohesive approach for the problem of rural fires and the directly related problem of the valorization of forest (market and nonmarket) products and services. The consortium comprises 16 institutions including the main national universities, R&D centers, industries and forestry agents of Portugal. It involves the researchers from private and public institutions, including CITAB/UTAD. This initiative is an unprecedented effort to bring together specialists in several research fields for developing a joint interdisciplinary and holistic approach, which merges the scientific knowledge in forest management, fire prevention and suppression, including ecological, economic, and social interactions, as well as the efforts for technical gualification of the involved parties. Its mission is to focus and to articulate research & innovation and technology transference activities with a view to increasing the competitiveness of the Portuguese forest sector and reducing the negative consequences of rural fires.



Principal Investigator at CITAB: Maria Emília Silva & Paulo Fernandes Leader Institution: Administration Board, composed by 9 associates (PT) Web site: http://www.forestwise.pt/pt/institution/ Funded under: NORTE2020 programme



COLLABORATIVE LABORATORIES





COLAB VINES & WINES

Competitiveness and sustainability of Portuguese vineyards and wines

Start date: July 2019 Duration: 36 months

CoLab VINES & WINES is a specific Collaborative Laboratory Research Consortium formed between companies and research units from wine and vineyard sector that intends to explore new dimensions of knowledge, creating and sell new products and services, with high financial benefits, generating economic income and creating highly qualified jobs. This consortium is promoted and coordinated by ADVID – Associação para o Desenvolvimento da Viticultura Duriense (Vila Real, Portugal) with the participation of researchers from CITAB/UTAD, University of Porto, Instituto Superior de Agronomia, University of Lisbon, Institute of Systems and Computer Engineering, Technology and Science (INESC TEC) and from the Faculty of Biotechnology of the Catholic University of Portugal.

Its mission is to transfer knowledge and technology to producers and its associates, and support the ambition expressed by the wine sector to grow 25% in export value (reach 1 billion euros for the next 5 years). In addition, to prepare and to adapt the national wine system to the great challenges it faces, of which, climate change is perhaps the greatest.



Participant Investigators from CITAB: João Santos & José Moutinho Pereira Leader Institution: ADVID - Associação para o Desenvolvimento da Viticultura Duriense (PT) Web site: http://advid.pt/ Funded under: NORTE2020 programme





Integrative Research in Environment, Agro-Chains and Technology

Start date: May 2016 Duration: 48 months

INTERACT integrative project intends to know the opportunities and the productive potential based on the local economy, particularly in the field of agri-food resources based on animal production (meat and milk), vegetables, fruits, olives, nuts, wine, forest and native flora, and medicinal plants. The technological increase in the North region is also sought, mainly through the development and diffusion of innovation and know-how to increase its competitiveness by increasing the efficiency of production processes and added value, not forgetting the maintenance of the sustainability of ecosystems, which implies the use of environmentally friendly technologies. INTERACT is organized in 3 linked research lines: Innovation for Sustainable Agro-food Chains (ISAC); BioEconomy and Sustainability (BEST) and Sustainable Viticulture and Wine Production (VitalyWine). These lines are perfectly aligned with CITAB research, and benefit from the contribution of other specialists in the areas of socio-economics, chemistry, ecology, geology, molecular biology or veterinary sciences, from other UTAD research centres, namely the CQVR, CETRAD or CECAV.



Participant Investigators from CITAB: Rui Cortes (Consortium Coordinator) Leader Institution: University of Trás-os-Montes and Alto Douro (PT) Web site: https://interact.utad.pt/ Funded under: NORTE2020 programme







MODFIRE



A multiple criteria approach to integrate wildfire behavior in forest management planning.

Start date: March2019 Duration: 36 months

The aim of this project is to bring together multidisciplinary state-of-theart knowledge on forest ecosystems models, wildfire simulation, forest ecosystem management planning methods, forest policy and economics and stakeholder engagement and research dissemination, to develop scientifically sound methods and design tools that may help forest policy and decision makers address the challenge of integrating wildfire concerns in landscape-level forest management planning. This will encompass the development, integration, and utilization of a forest management planning wildfire behaviour model, tools to simulate decision spaces under scenarios of climate change and spatial optimization and multiple criteria approach that may help select from those decision spaces plans that may address effectively wildfire concerns by forest stakeholders.



Participant Investigators from CITAB: Paulo Fernandes Leader Institution: Instituto Superior de Agronomia/ULisbon (PT) Web site: https://www.modfire.net/ Funded under: FCT - Prevention and Fighting of Forest Fires Project Grants





Preclinical efficacy of sulforaphane or Brassica whole extract: a strategy to fight obesity and valorize Brassica byproduct

Start date: June 2018 Duration: 36 months

ValorizeByProducts project aims to minimize the negative environmental and economic impacts of Brassica cultivars byproducts through their valorization. We hypothesise that some Brassica cultivars byproducts may be used to prevent or treat obesity and obesity-related diseases (diabetes, cancer, cardiovascular diseases).

The selection of cruciferous vegetables is based on the fact that Brassicas are common crops in the Portuguese agriculture, having, thus, a great economic interest, and because Brassicas, particularly broccoli, are rich in glucoraphanin, the sulforaphane (SFN) precursor. Specifically, we intend to test the efficacy of dried extract from Brassica byproducts (stems and leaves) in the prevention or treatment of obesity. At the same time, the effect of SFN commercially available will be tested with the same purpose just to evaluate if this bioactive compound has more effect alone or in conjunction with the other components present in the dried extract from Brassica byproducts (BBE); ii) to prepare and obtain a dried extract from Brassica byproducts (BBE); iii) to test the biological activity of BBE in three distinct in vitro models; iii) to establish the pharmacokinetic model of BBE in mice; and iv) to characterize the anti-obesity actions of BBE in animals fed with a high-fat and high-sucrose (HFHS) diet and compare it with the anti-obesity actions of SFN alone.

Principal Investigator at CITAB: Eduardo Rosa (Consortium Coordinator) Leader Institution: University of Trás-os-Montes and Alto Douro (PT) Web site: NA

Funded under: FCT - SR&TD Project Grants



VALORIZEBYPRODUCTS







INFRAVINI

Spatial data infrastructure for the management of climate change in the vineyard

Start date: July 2019 Duration: 24 months

INFRAVINI co-promotion project will create a decision support platform which will include climatic and agronomic indicators, allowing winegrowers located in any area of any wine region to benefit from the cross-referencing and normalization of local sensory and forecast climate information collected in one so-called "observatory", which main function is to monitor both the impact of meteorological variability and the impact of climate change on certain spatially and temporally referenced territories. A pilot phase will be promoted, in which the information gathered in an exhaustive way will be cross-referenced in the ADVID winegrowing observatory (network of 21 vineyards reference plots, by using soil probes, sensors, meteorological stations, among others), with the spatial information base (factual and forecast) that the INFRAVINI platform will provide. The project is promoted by Geodouro - Consultoria e Topografia, Lda. company, along with the partners UTAD/CITAB, ADVID and INESCTEC.



Participant Investigators from CITAB: João Santos Leader Institution: Geodouro - Consultoria e Topografia, Lda (PT) Web site: https://www.infravini.pt/ Funded under: NORTE2020 programme





Technology and innovation in the shiitake and other nutraceutical and medicinal mushrooms production chain

Start date: July 2018 Duration: 36 months

The goal of FUNGITECH co-promotion project is the development of practical innovative solutions to the mushroom sector, by a multidisciplinary approach, in particular, to optimize the mushroom yield and quality, to increase the scientific knowledge on beneficial bioactivities in shiitake and other edible and medicinal fungal species and to evaluate processing methods of the wastes generated into added-value products. Alternative substrates for mushroom production using agro-industrial and agroforestry co-products are being developed aiming to recycle the wastes materials and increase the biological efficiency (BE) in the conversion into edible mushrooms. Submerged liquid fermentation of some fungal species are also being tested in order to provide more uniform and reproducible biomass and bioactive compounds. The project is promoted by Chikioshira SAG, Lda./Floresta Viva company with UTAD/CITAB as a partner.



Principal Investigator at CITAB: Guilhermina Marques Leader Institution: Chikioshira Lda (PT) Web site: https://fungitech.pt/ Funded under: NORTE2020 programme

EUNGITECH







SUSTENTOLIVE



Start date: October 2017 Duration: 48 months

Although the importance of irrigation to increase productivity, it reduces unproductive time and mitigate the effect of alternate bearing. In Trás-os-Montes region, there is a lack of information of irrigation needs and the response of regional cultivars to deficit strategies to ensure rational use of water. SustentOLIVE project aims to improve irrigation practices for a more efficient water management, by adopting different deficit irrigation strategies and by improving the performance of irrigation systems that maximize irrigation efficiency and optimize water productivity, ensuring the Eco - Sustainability of olive cultivation. The project will allow assessing the response of different Cvs. to diverse strategies of deficit irrigation, based either on the efficiency of water use, increasing productivity and olive oil quality. This will allow an advance on economic yield of olive groves as a result of a cut in irrigation costs, increasing the competitiveness of the regional olive sector, both at national and international level.



Grupo Operacional Olivicultura e Azeite

Participant Investigators from CITAB: Anabela Silva (Consortium Coordinator) Leader Institution: University of Trás-os-Montes and Alto Douro (PT) Web site: https://sustentolive.utad.pt/ Funded under: PDR2020 programme



Operational Group - Use of Mating disruption to control the European grapevine moth, *Lobesia botrana*, in steep slope viticulture: case of the Douro Demarcated Region

Start date: June 2018 Duration: 38 months

The European Grapevine Moth (EGM), Lobesia botrana (Denn. & Schiff), is the most important vineyard pest in Douro Demarcated Region (DDR). The mating disruption (MD) technique, an environmental safe control method against this pest, has been used in this region since 2000 although not always with the best results. The overall objective of CSinDouro project is to increase knowledge about the impact of the meteorological data, landscape, cultural operations and characteristics of the vineyards in the distribution of the pheromone cloud, in order to develop a methodology of application suitable for DDR conditions. In this sense, it is intended to: i) clarify the role of vegetation surrounding vineyards, in particular the presence of olive trees and Daphne gnidium, and its effect on pest distribution and MD effectiveness; ii) adapt the density and distribution of dispensers to each vineyard plot, in order to obtain the most adequate coverage of the pheromone cloud; iii) adjust, to DDR conditions, other models of dispensers under development. The project involves 6 institutions: ADVID (Promoter), UTAD/CITAB, Real Companhia Velha, Sogevinus, S.A., D. Matilde Vinhos Lda., and Quinta do Vallado Lda.



Principal Investigator at CITAB: José Aranha Leader Institution: ADVID - Associação para o Desenvolvimento da Viticultura Duriense (PT) Web site: http://advid.pt/ Funded under: PDR2020 programme



CSINDOURO



RURAL DEVELOPMENT OPERATIONAL GROUPS





GO VESPA

Operational Group - Control and minimization of damages caused by invasive species Vespa velutina nigrithorax (Vespa velutina) in beekeeping

Start date: January 2018 Duration: 48 months

GO Vespa project is focused on the development of strategies that limit and condition the access of the invasive species Vespa velutina nigrithorax (Vespa velutina) to apiaries and, thus, contribute to the ecosystem recovery. For that purpose, three main objectives were set: i) to reduce the Vespa velutina nigrithorax's presence in apiaries to levels that do not compromise the regular hive activity and productivity, through the installation of wasps' traps from midwinter to the end of spring in order to catch potential queen wasps and, this way, reduce the number of future wasps' colonies; ii) to proceed to the annual account of wasps' nests and its geographical location, so potential places to be colonized by this invasive wasp can be predicted (based on this information, a potential spread model was created and it is also used to advise beekeepers about the places to install wasps' traps); iii) to identify and characterize suitable mountain places to install new apiaries to be used in transhumance actions and, this way, avoid wasps' presence and take advantage of multi-season flowering. The project comprises 16 partners, among four local agrarian associations and ten individual beekeepers, being UTAD-CITAB the research partner.



Participant Investigators from CITAB: José Aranha Leader Institution: Dolmen (PT) Web site: https://www.go-vespa.pt/ Funded under: PDR2020 programme

INTERNATIONAL PROJECTS

PYROLIFE - Training the next generation of integrated fire management experts. CITAB coordinator: Paulo Fernandes. Starting date: October 2019, duration: 48 months (H2020-MSCA-ITN - GA 860787). CITAB/UTAD funding: 237.720,24€. http://pyrolife.lessonsonfire.eu/

Atlantic-Positive - Conservation of Atlantic pollination services and control of the invasive species Vespa velutina. CITAB coordinator: José Aranha. Starting date: May 2019, duration: 36 months (INTERREG Atlantic Area). CITAB/UTAD funding: 136.500,00€ http://www.atlanicpositive.eu/

TRIPLE-C: Capitalising climate change projects in risk management for a better AA resilience. CITAB coordinator: Ronaldo Gabriel. Starting date: April 2019, duration: 36 months (INTERREG EAPA_772/2018). CITAB/UTAD funding: 170.000,00€ http://www.triplecproject.eu/

Clim4Vitis - Climate change impact mitigation for European viticulture: knowledge transfer for an integrated approach. Consortium coordinator: João Santos. Starting date: August 2018, duration: 36 months (WIDESPREAD-GA 810176). CITAB/UTAD funding: 374.163,75€ http://www.clim4vitis.eu/

BRESOV - Breeding for Resilient, Efficient and Sustainable Organic Vegetable production. CITAB coordinator: Eduardo Rosa. Starting date: May 2018, duration: 48 months (H2020-SFS -GA 774244). CITAB/UTAD funding: 100.000,00€ http://bresov.eu

"Dairy-4-Future - Propagating innovations for more resilient dairy farming in the Atlantic area". CITAB coordinator: Henrique Trindade. Starting date: March 2018, duration: 36 months (INTERREG EAPA_304/2016). CITAB/UTAD funding: 281.975,00€ http://www.dairy4future.eu/

NASPA - Natural fungicides against air & soil borne pathogens in the Atlantic Area". CITAB coordinator: Berta Gonçalves. Starting date: December 2017, duration: 30 months (INTERREG EAPA_451/2016). CITAB/UTAD funding: 274.029,64€ http://www.keep.eu/projects/19361/

"EURODAIRY - A Europe-wide Thematic Network on improving resource use efficiency in dairy farming". CITAB/UTAD Coordinator: Henrique Trindade. Starting date: February 2016, duration: 36 months (H2020–ISIB-GA 696364). CITAB/UTAD funding: 36.865,00€ http://www.eurodairy.eu "TurboSudoe - Development, validation and demonstration of a model based on a network of 'TRansference BrOkers' for a direct technology transference between R&D centres and companies in the SUDOE territory". CITAB coordinator: Eduardo Rosa. Starting date: July 2016, duration: 36 months (INTERREG SOE1/P1/E0136). CITAB/UTAD funding:150.358,92€

http://www.turbo-sudoe.eu/

"ALICE - Improving the management of Atlantic Landscapes: accounting for blodiversity and eCosystem sErvices". CITAB coordinator: Edna Cabecinha. Starting date: November 2017, duration: 36 months (INTERREG EAPA_261/2016). CITAB/UTAD funding: 264.483,38€ http://project-alice.com/

"IBERPHENOL- Cooperative research network in the field of polyphenols and their industrial applications". CITAB coordinator: Eduardo Rosa. Starting date: October 2015, duration: 51 months (INTERREG 0377_Iberphenol_6_E). CITAB/UTAD funding: 181.888,00€ http://iberphenol.eu/

"UNI+i - Transboundary Cooperation Northern of Portugal- Castilla and Léon for the promotion of innovative entrepreneurship and business competitiveness". Consortium coordinator: Helena Moreira. Starting date: May 2017, duration: 23 months (INTERREG POCTEP 0050_UNI_PLUS_I_2_P). CITAB/UTAD funding: 126.375,00€

"Atlantic-Geoparks - Transnational Promotion and Cooperation of the Atlantic Geoparks for sustainable development". CITAB coordinator: Ronaldo Gabriel. Starting date: June 2017, duration: 30 months (INTERREG ref - EAPA_250/2016) CITAB/UTAD funding: 207.037,50€ http://keep.eu/projects/19280/

"FLUMEN DURIUS - Promotion and valorization of the tourist resources of Douro river". CITAB coordinator: Helena Moreira. Starting date: July 2017, duration: 51 months (INTERREG POCTEP 0067_Flumen_Durius_2_E) CITAB/UTAD funding: 104.062,50€ http://www.flumendurius.eu.

CONFREMU - Conservation of freshwater mussels: a pan-European approach. CITAB coordinator: Simone Varandas. Starting date: October 2019, duration: 48 months (COST Action CA18239). CITAB/UTAD funding: N/A

FIRElinks - Fire in the Earth System: Science & Society. CITAB coordinator: Mário G. Pereira. Starting date: April 2019, duration: 48 months (COST Action Ca18135). http://firelinks.eu/. INTEGRAPE – Data integration to maximise the power of omics for grapevine improvement. CITAB coordinator: Hernâni Gerós. Starting date: September 2018. Duration: 48 months (COST Action CA17111). CITAB/UTAD funding: N/A http://www.integrape.eu/index.php

"ECOMAR – Valuation and Monitoring of Marine and Coastal Ecosystem Services in Iberoamerican countries". CITAB participant: Edna Cabecinha. Starting date: January 2017, duration: 46 months (CYTED). CITAB/UTAD funding: N/A http://futureoceanslab.org/ecomar/

"PAIRED - Magnetically and photochemically actuated bioactive nanowires for remotely controlled drug delivery". CITAB participant: Amélia Silva. Starting date: October 2016, duration: 36 months (ERA-NET/0004/2015). CITAB/UTAD funding: N/A



FORESTWISE - Collaborative Laboratory for Integrated Forest & Fire Wise Management. CITAB Coordinator: Maria Emília Silva. Starting date: September 2019. Duration: 36 months. CITAB/UTAD funding: N/A http://www.forestwise.pt/

VINES & WINES - Competitiveness and sustainability of Portuguese vineyards and wines. Participant researcher from CITAB: João Santos & José Moutinho. Starting date: July 2019. Duration: 36 months. CITAB/UTAD funding: N/A http://www.advid.pt/vinhaevinho

INFRAVINI -Spatial data infrastructure for the management of climate change in the vineyard. CITAB Coordinator: João Santos. Starting date: July 2019. Duration: 24 months. Promotor: Geodouro Lda (AAC 31/SI/2017/039739). CITAB/UTAD funding: 53.426,77€ http://www.infravini.pt/

FireSmart: Nature-based solutions for fire risk management and sustained provision of ecosystem services. CITAB Coordinator: João Santos. Starting date: July 2019. Duration: 36 months (PCIF/MOG/0083/2017).CITAB/UTAD funding: 30.742,50€

CoLab4FOODS - Collaborative Laboratory for Innovation in the Food Industry. CITAB Coordinator: Ana Barros. Starting date: April 2019. Duration: 36 months. CITAB/UTAD funding: N/A http://colab4food.com/

SCAPEFIRE - A sustainable landSCAPE planning model for rural FIREs prevention. CITAB Coordinator: João P. Carvalho. Starting date: March 2019. Duration: 36 months (PCIF/MOS/0046/2017). CITAB/UTAD funding: 25.965,00€

ModFire - A multiple criteria approach to integrate wildfire behaviour in forest management planning. CITAB Coordinator: Paulo Fernandes. Starting date: March 2019. Duration: 36 months (PCIF/MOS/0217/2017). CITAB/UTAD funding: 24.115,00€ http://www.modfire.net/

FungiTech - Technology and innovation in the shiitake and other nutraceutical and medicinal mushrooms production chain. (COpromoção). CITAB Coordinator: Guilhermina Marques. Starting date: July 2018. Duration: 36 months. Promotor: Chikioshira Lda (NORTE-01-0247-FEDER-033788). CITAB/UTAD funding: 233.488,77€ http://fungitech.pt

MitiVineDrought - Combining "omics" with molecular, biochemical and physiological analyses as an integrated effort to validate novel

and easy-to-implement drought mitigation strategies in grapevine while reducing water use. Consortium coordinator: Artur Conde. Starting date: October 2018. Duration: 36 months (POCI-01-0145-FEDER-030341). CITAB/UTAD funding: 197.476,60€

Transcriptome and metabolome reprogramming in Vitis vinifera cv. Aragonês and Vitis rupestris berries upon infection with Erysiphe necator. CITAB coordinator: Hernâni Gerós. Starting date: October 2018. Duration: 36 months (POCI-01-0145-FEDER). CITAB/UTAD funding: 71.171,94€

BerryPlastid - **"Biosynthesis of secondary compounds in the grape berry: unlocking the role of the plastid".** CITAB coordinator: Hernâni Gerós. Starting date: October 2018. Duration: 36 months (POCI-01-0145-FEDER-028165). CITAB/UTAD funding: 191.726,43€

EOIS-CropProt - Essential oils, infusions, and silicon in crop protection. A study using tomato plants, as a model, to disclose the biopesticides induced defense mechanisms of plants, through an omics approach. Consortium coordinator: Manuel Ferreira. Starting date: August 2018. Duration: 36 months (POCI-01-0145-FEDER-031131). CITAB/UTAD funding:N/A

ZEBREFINE: Optimization of anesthesia in zebrafish: economic, clinical and animal welfare implications. CITAB coordinator: Luis Antunes. Starting date: July 2018. Duration: 36 months (POCI-01-0145-FEDER-029542). CITAB/UTAD funding: 63.600,00€

BoFraPla: Development of an innovative composite system for stabilization of comminuted bone fractures. CITAB coordinator: José Morais. Starting date: July 2018. Duration: 36 months (POCI-01-0145-FEDER-028225). CITAB/UTAD funding: 6.781,25€

Safe NPest: Synthesis and Environmental Safety of Nanopesticides. CITAB coordinator: Tatiana Andreani / Amélia Silva. Starting date: July 2018. Duration: 36 months (POCI-01-0145-FEDER-029343). CITAB/UTAD funding: 67.175,00€

ResinPro: How to increase resin production in Pinus pinaster more sustainably. CITAB coordinator: José Lousada. Starting date: July 2018. Duration: 36 months (POCI-01-0145-FEDER-031231). CITAB/UTAD funding: 12.689,25€

VALORIZEBYPRODUCTS: Preclinical efficacy of sulforaphane or Brassica whole extract: a strategy to fight obesity and valorize Brassica byproduct. Consortium coordinator: Eduardo Rosa. Staring date: June 2018. Duration: 36 months (POCI-01-0145-FEDER-029152). CITAB/UTAD funding: 194.423,90€ TO CHAIR: The Optimal Challenges in Irrigation. CITAB coordinator: Aureliano Malheiro. Starting date: June 2018. Duration: 36 months (POCI-01-0145-FEDER-028247). CITAB/UTAD funding: 32.537,50€

ConBiomics: Approach for the Conservation of Freshwater Bivalves. CITAB coordinator: Simone Varandas. Starting date: January 2018, duration: 36 months (POCI-01-0145-FEDER-030286). CITAB/UTAD funding:6.250,00€

"GO +PrevCRP - Development of integrated strategies for the prevention of pine pitch canker". CITAB coordinator: Luís Martins. Starting date: April 2017, duration: 48 months (Operational Group). CITAB/UTAD funding: 62.506,27€

"GO BioPest - Integrated strategies to fight against key pests in nut species". CITAB coordinator: Luís Martins. Starting date: April 2017, duration: 45 months (Operational Group). CITAB/UTAD funding: 30.226,65€

"GO Preserve the quality of Arouquesa meat". CITAB coordinator: Carlos Venâncio. Starting date: April 2017, duration: 48 months (Operational Group). CITAB/UTAD funding: 227.178,66€

"GO Efluentes - Livestock effluents: strategic approach towards agronomic and energetic valorization of flows in the farming activity.". CITAB coordinator: Henrique Trindade. Starting date: June 2017, duration: 48 months (Operational Group). CITAB/UTAD funding: 48.725,73€

"GO VITISHIDRI – Strategies for the management of water stress of the Douro Superior vineyards". CITAB coordinator: Aureliano Malheiro. Starting date: March 2017, duration: 48 months (Operational Group).CITAB/UTAD funding: 100.603,83€

"GO Control and minimization of damages caused by invasive species Vespa velutina nigrithorax (Vespa velutina) in beekeeping". CITAB coordinator: José Aranha. Starting date: January 2018, duration: 48 months. Promotor: Dolmen CRL (Operational Group). CITAB/UTAD funding: 98.021,09€ http://www.go-vespa.pt/

"GO New management practices in rainfed olive orchards strategies for mitigation and adaptation to climate change". CITAB coordinator: Carlos Correia. Starting date: January 2017, duration: 48 months (Operational Group). CITAB/UTAD funding: 103.513,41€

NATIONAL PROJECTS

"GO ClimCast - The new challenges for the chestnut orchards in the context of climate change". CITAB coordinator: Mário Pereira. Starting date: September 2017, duration: 43 months (Operational Group). CITAB/UTAD funding: 74.650,85€

"GO Valorization of the Resende cherry production and market positioning of the chain". CITAB coordinator: Berta Gonçalves. Starting date: March 2017, duration: 43 months (Operational Group). CITAB/UTAD funding: 166.850,59€

"GO SustentOlive - Improvement of irrigation and fertilization practices at olive farms in Trás-os-Montes for its sustainability". Project coordinator: Anabela Silva. Starting date: October 2017, duration: 51 months (Operational Group). CITAB/UTAD funding: 193.496,98€

http://sustentolive.utad.pt/

GO ValorCast - Chestnut valorisation and optimization of its commercialization. CITAB Coordinator: Jorge Ventura. Starting date: September 2017. Duration: 48 months (PDR2020-101-032036). Promotor: RefCast (Operational Group). CITAB/UTAD funding: 67.250,00€

GO EGIS: Strategies for integrated soil and water management in nut species. CITAB coordinator: Carlos Correia. Starting date: April 2017. Duration: 45 month. Promotor: UTAD (PDR2020-101-030994) (Operational Group). CITAB/UTAD funding: 47.857,95€

GO Phytosanitary protection strategies for sustainable apple production. CITAB coordinator: Maria Isabel Cortez. Starting date: January 2018. Duration: 48 months. Promotor: UTAD (PDR2020-101-031962) (Operational Group). CITAB/UTAD funding: 48.454,77€

GO CSinDouro - Sexual Confusion against grape moth, Lobesia botrana (Denn. & Schiff.) in mountain viticulture: the particular case of the Douro Demarcated Region (RDD). CITAB coordinator: Laura Torres. Starting date: October 2017, duration: 39 months. Promotor: ADVID. (Operational Group). CITAB/UTAD funding: 118.377,23€ http://advid.pt/CSinDouro

GO BioChestnut-IPM - Implement effective control strategies against the chestnut and almond diseases. CITAB coordinator: Luís Martins. Starting date: April 2017. Duration: 42 month. Promotor: CENTRO NACIONAL DE COMPETÊNCIAS DOS FRUTOS SECOS - ASSOCIAÇÃO CNCFS (PDR2020-101-030947) (Operational Group). CITAB/UTAD funding: 50.000,00€ TERR@ENO – Terroir and agro-ecological zoning as a critical factor for the competitiveness and innovation of Vinhos Verdes. CITAB coordinator: Maria Isabel Cortez. Starting date: April 2017, duration: 24 months. Promotor: UTAD. Partners: Adega Cooperativa de Ponte de Lima Crl, Adega Cooperativa Regional de Monção Crl; Instituto Politécnico de Viana do Castelo] (NORTE – 02-0853-FEDER-000113). CITAB/UTAD funding:120.076,54€

INTERACT - Integrative Research in Environment, Agro-Chains and **Technology.** CITAB coordinator: Rui Cortes. Starting date: May 2016, duration: 48 months (ON.2 – NORTE-01-0145-FEDER-000017). CITAB/UTAD funding: 4.127.773,50€

INNOVINE&WINE – Vineyard and Wine Innovation Platform. CITAB coordinators: João Santos & Aureliano Malheiro. Starting date: April 2016, duration: 36 months. (NORTE-01-0145-FEDER-000038). CITAB/UTAD funding: 1.124.971,76€

RUNaway - Running away from prostate cancer: Walking through the molecular basis of physical activity. Project coordinator: Paula A. Oliveira. Starting date: July 2016, duration: 36 months (PTDC/DTP-DES/6077/2014). CITAB/UTAD funding: 85.968,00€

LEGSeedCOAT - Legume seed coating with beneficial microorganisms for increased productivity and resilience under climate change conditions. CITAB coordinator: Guilhermina Marques. Starting date: July 2016, duration: 36 months (PTDC/AGR-TEC/1140/2014). CITAB/UTAD funding: 82.800,00€

Cherry cracking & mitigation strategies: towards their understanding using a functional metabolomic approach. Project coordinator: Berta Gonçalves. Starting date: June 2016, duration: 36 months (PTDC/AGR-PRO/7028/2014). CITAB/UTAD funding: 164.002,00€

FIREXTR - Prevent and prepare society for extreme fire events: the challenge of seeing the forest and not just the trees. CITAB coordinator: Mário Gonzalez Pereira. Starting date: May 2016, duration: 36 months (PTDC/ATPGEO/0462/2014). CITAB/UTAD funding: 54.960,00€

SOLAR - Earth System Modelling of the Eastern Atlantic Region. CITAB coordinator: João Santos. Starting date: September 2016, duration: 36 months (PTDC/GEO-MET/7078/2014). CITAB/UTAD funding: 3.120,00€

SPLICETHER - Application of splicing approaches to exploit alternative therapies for Lysosomal Storage Diseases: in vitro and in vivo studies. CITAB coordinator: Paula A. Oliveira. Starting date: May 2016, duration: 36 months. (PTDC/BBB-BMD/6301/2014). CITAB/UTAD funding: 14.400,00€

FRESHCO - Multiple implications of invasive species on Freshwter Mussel coextinction processes. CITAB coordinator: Simone Varandas. starting date: April 2016, duration: 36 mouths (PTDC/AGR-FOR/1627/2014). CITAB/UTAD funding: 19.500,00€

ALIEN - An integrated approach to unravel Lasiodiplodia-grapevine Interaction. CITAB coordinator: J. Moutinho Pereira. Starting date: June 2016, duration: 36 months. (PTDC/AGR-PRO/2183/2014). CITAB/UTAD funding:16.920,00€

DEUS EX MACHINA - Symbiotic technology for societal efficiency gains". CITAB Coordinator: Pedro Melo Pinto. Starting Date: January 2016. Duration: 48 months (NORTE-01-0145-FEDER-000026). CITAB/UTAD funding: 146.340,00€

PARRA – Integrated platform for monitoring and evaluation of the Flavescence dorée disease in the vineyard. CITAB Coordinator: Irene Oliveira. Starting Date: April 2016. Duration: 36 months. Promotor: Tekever ASDS, Lda. (LISBOA-01-0247-FEDER-003447). CITAB/UTAD funding: 25.000,00€

Common Forest - Promotion of native forests for products and ecosystem services. CITAB Coordinator: João Paulo Carvalho. Starting Date: January 2016. Duration: 48 months. CITAB/UTAD funding: N/A



OUTREACH

OUTREACH



2019 outreach activities, directed to youngsters and to general society, included exhibitions, activities at schools, visits to CITAB's laboratories, courses, talks and workshops under the initiatives "Cientificamente Provável", "Science and Technology Week", "European Researchers' Night -Science Wars", "OCJ-Ciência Viva no Verão" and the "Encontro Ciência", among others.

Regarding media outreach, including general public and specialized technical press, CITAB research projects/results were mentioned more than 120 times including newspapers, radio, television and web news, being 5% of these references in international dissemination sources.

































ORGANIZATION OF CONFERENCES



International congress "Digital Agro-food & Forestry (r)evolution"

UTAD – Vila Real | December 12th – 13th 2019

The 2-day congress "Digital Agro-food & Forestry (r)evolution", jointly organized with INESC-TEC, focused on the link between research and innovation, using new technologies in agro-food and forestry value chains, including the Internet of Things and Big Data, Artificial Intelligence, Robotics and Remote Sensing.

The plenary lectures were conducted by prominent keynote speakers from Australia, Spain and also from the industry, promoting discussion on topics such as the vineyard of the future, machine learning modelling, integration of technologies: from tree to the palate, functional foods and digital technologies for more resilient and sustainable forest value chains, among others.

The congress ended with a debate dedicated to viticulture and a technical visit to a Douro Demarcated Region's wine producer.

CITAB's Director, Ana Barros, and José Boaventura, Coordinator of INESC TEC Pole at UTAD, expressed the "pleasure for the success of the initiative" that brought to UTAD renowned national and international specialists, promoting the use of new technologies for a more sustainable food production.

International Workshop "From the Stream to the Coast: valuing ecosystem services to promote the sustainable development of river basins"

UTAD – Vila Real | November 8th – 9th 2019

Under the established collaboration protocol between CITAB and CIIMAR the International Workshop "From the Stream to the Coast: valuing ecosystem services to promote the sustainable development of river basins" gathered participants within several networking sessions lectured by invited national and international experts on Ecosystems Services.

Aiming to collect information and views on the valuation of ecosystem services from various regions of the Douro River basin from the stream to the coast, and to understand how this approach based on ecosystem services can be used to support decision-making, the Workshop payed special attention to the demonstrative relevance of freshwaters, estuarine and coastal ecosystem services, promoting the participation of different stakeholders and policy decision-makers, since they influence and are influenced by decisions on land uses and management. A special focus was given to the economic valuation of the ecosystem services, not only for the methodological challenges involved, but also because the final outputs can be of major interest for managers and policy-makers, with high impact on stakeholders.





4th INTERACT Conference - Challenges for rural territories in Trás-os-Montes and Alto Douro

UTAD – Vila Real | April 10th 2019

On the corollary relating to the disclosure of the results obtained and the dynamic of interaction with local and regional entrepreneurs and agents, the 4th INTERACT Conference - Challenges for rural territories in Trás-os-Montes and Alto Douro, discussed the challenges the agrarian sector face in the North of Portugal and how the research institutions will act on those issues.

During the event, scientific experts and producers associations, invited to be part of this discussion, participated on three round tables that debated crucial topics of the agroforestry and food sectors.

The first panel addressed the topic of "Environmental Sustainability and Climate Change", concluding that there is a need to combine agriculture and biodiversity, through the concepts of Rewilding, Landspare and Landshare.

The second panel focused on "Bio-products and Technological Innovation", showing techniques used in viticulture by the two companies represented, and concluding that viticulture is viable but it is essential that there is an effective knowledge sharing between universities and winegrowers.

Finally, the third panel discussed the topic "Rural Desertification and Territorial Cohesion". Agriculture (mainly family farming) plays a key role in the resilience of territories. Thus, it is necessary to define sustainable development models in the territories, taking into account the increased pressure on food systems.

Clim4Vitis Conference - Evaluating the impact of climate change on viticulture

UTAD – Vila Real | February 18th – 21st 2019

The H2020 Twinning project Clim4Vitis - Climate change impact mitigation for European viticulture: knowledge transfer for an integrated approach, launched its first event in the beginning of 2019, with a workshop on "Grapevine Modelling" and short courses in the area of "Viticulture & Climate Change", during three days.

During the "Grapevine Modelling" workshop, Clim4Vitis partners presented their research on climate and crop simulation models. A surprising 113 participants, among students, researchers and relevant stakeholders, attended this event. The "Viticulture & Climate Change" short courses, given by the Clim4Vitis partners aimed to raise the audience awareness on the climate change impact in viticulture. These were attended by about 80 participants (among students, researcher and stakeholders) and addressed topics such as observation and modelling of the climate system, past and future projections in climate change in Luxembourg and climate changes projection and analysis of some approaches for evaluating the impact of climate change on viticulture.



PRIZES, AWARDS & DISTINCTIONS





Felisbina Queiroga was elected for the Executive Board of the World Small Animal Association (WSAVA), in the general assembly meeting of July 15th 2019, in Toronto (Canada), for a 2-year mandate. This is the first time a Portuguese researcher takes on a position in the Executive Board of this world association, with 87 countries, 110 associations and over 200.000 members.

Domingos Lopes was appointed as the Vice President of the Côa Foundation, which was created for managing the heritage of the Côa Valley, by order of the Minister of Culture. Domingos Lopes will be responsible for the scientific activity, studies and projects.





José Laranjo is the new Coordinator of EuroCastanea - European Chestnut Network. EuroCastanea is the representative structure of the chestnut value chain at European level and currently includes representatives from Portugal, Spain, France and Italy, being supported by the Assembly of European Regions producing fruit, vegetables and plants (A.R.E.F.L.H.).

Luís Martins led the team responsible for the recovery and rehabilitation of "Freixo Duarte de Armas" the iconic and symbolic tree of Freixo de Espada à Cinta. This tree age is estimated to be over 500 years and is considered to be a Public Interest Tree.





Maria José Saavedra is one of three Portuguese researchers in the Study Group of Veterinary Microbiology (ESGVM) of the European Society of Clinical Microbiology and Infectious Diseases (ESCMID), with members from all continents. N. Machado, M. Rodrigues, I. Gouvinhas, R. Sousa, B. Carbas and A. Abraão won the first prize of UTAD's competition "FoodValorization", with "Couscous of alternative flours" an innovative Couscous, made out of alternative flours and gluten and lactose free. A. Gonçalves, C. Brito, E. Silva, L. Rocha and S. Martins conquered the 3rd place with "Sheep cheese DOP -Olive+", a new sheep cheese with olive oil.



DOCTORAL PROGRAMMES



AGRICHAINS



Agricultural Production Chains: from fork to farm

Doctoral Programme, coordinated by CITAB, with a joint diploma granted by the University of Trás-os-Montes e Alto Douro (UTAD) and the University of Minho (UMinho), with a partnership of the University of Wageningen (WUR) and the Polytechnic University of València (UPV).

5TH EDITION STARTED IN MAY 2019



CITAB launched the 5th edition of AgriChains Doctoral Programme in May 2019, with 8 new students. Similar to previous years, AgriChains continues to respond to a trend in consumer demands and concerns by focusing on training in each step of the production value chain to achieve sustainable food production, and better food quality. Since its beginning, in 2014, AgriChains received almost 50 students from countries all over the world (China, India, Columbia, Tunisia, Croatia and Portugal), strongly motivated to solve challenging questions regarding agricultural production chain inputs. The 5th edition grants were funded by FCT, as in the previous editions.

FIRST AGRICHAINS DOCTORS, INCLUDING 2 EUROPEAN DOCTORATES

During 2019, seven students successfully defended their PhD thesis in the agro-food chain science that are relevant to national and European interests such as: "Genetic diversity and molecular responses to drought stress in Vigna unguiculata" (M. Carvalho); "Adaptative measures for olive rainfed orchads under a changing environment" (C. Brito); "Molecular mechanisms of Agrobacterium recognition and defense activation in recalcitrant plants" (W. Hou); "Effect of innovative crop management practices on physiological, nutritional and phytochemical characteristics of almond tree (Prunus amygdalus L.) products and co-products" (I. Prgomet); "Pre and postharvest innovative strategies to enhance cherry quality" (S. Correia); "Diet in prevention and treatment of colorectal cancer: the role of selected legumes of the Mediterranean diet" (C. Teixeira); and "Efficient tools to simulate main crops in Portugal for decision support systems" (C. Yang). Students I. Prgomet and C. Yang were pioneers developing part of their research studies at AgriChains partners' premises of UPV and WUR, respectively, which allowed them to achieve the European Doctorate title.

www.agrichains.utad.pt



DO*Mar Marine Science, Technology and Management

The Do*Mar is an international doctoral programme offered by a consortium of Portuguese and Galician Universities and Research Institutes: Universities of Aveiro, Minho, Trás-os-Montes e Alto Douro (UTAD), Porto, Vigo, Santiago de Compostela and Coruña, the Instituto Español de Oceanografia and the Consejo Superior de Investigaciones Cientificas. The School of Biology of the St. Andrews University (Scotland), the Station Biologique de Roscoff of the Université Pierre et Marie Curie (France) and the Instituto de Oceanografia of the Universidade de São Paulo (Brasil) are associated members of the consortium.

5TH EDITION STARTED IN OCTOBER 2019

The Do*Mar consortium launched the 5th edition of Do*Mar Doctoral Programme in October 2019, with 11 new students, 8 with Do*Mar FCT grants. Since its beginning, in 2014, more than 300 students enrolled in Do*Mar, 60 of them in the 3 Portuguese Universities (UTAD, Aveiro and Minho) from countries all over the world (China, Brazil, Iran, Angola, Italy, Spain and Portugal), strongly motivated to solve challenging questions regarding the sustainability of our Oceans. The 5th edition grants were funded by FCT, as in the previous editions.

FIRST DO*MAR DOCTORS, INCLUDING EUROPEAN DOCTORATES

Since 2019, four of the students enrolled in Portuguese universities successfully defended their PhD thesis in this innovative international doctoral programme, in Marine science, focusing challenges at national and International level such as: 1) in Ocean Observation and Global Change branch - "Numerical and observational processes study of NW Iberian margin circulation (Nuno Cordeiro); "Assessment of trace metals in Antartic key marine organisms" (José Seco); 2) in Sustainable Use of Marine Resources branch - "Sphaerococcus coronopifolius bromoterpenes: Antitumor activity and intracellular signal pathways characterization on in vitro human cellular cancer models" (Celso Alves); "Sustainable aquaculture development in estuarine systems" (Leandro Vaz). José Seco developed part of his research at one Do*Mar associated partner, which allowed him to achieve the international PhD title given out by the 6 Universities involved in the consortium, but also a co-tutel degree given by St. Andrews University.





DOCTORAL PROGRAMMES

PRODUCTIVITY METRICS

OVERVIEW & HIGHLIGHTS



Chilling and heat forcing conditions under climate change scenarios predict vineyards and olive orchards distribution changes

Predictive models for chilling and heat forcing conditions under current climate changes projections show, particularly in Southern Europe, that suitable vineyards and olive orchards areas will be lost.

Fraga, H., Pinto, J.G., Santos, J.A. (2019). Climate change projections for chilling and heat forcing conditions in European vineyards and olive orchards, a multi-model assessment. CLIMATIC CHANGE 152,179–193. doi: https://doi.org/10.1007/s10584-018-2337-5

Farmland abandonment in mountain landscapes increases the risk of fire

A modelling and simulation approach applied to Portugal mountain fire-prone landscape showed that farmland abandonment decreases fire regulation capacity and fire protection ecosystem service. Also, the risk of fire and the intensity of the fire events were shown to be dependent of the vegetation cover that replaced rural landscape.



Sil, A., Fernandes, P.M., Rodrigues, A.P., Alonso, J.M., Honrado, J.P., Perera, A., Azevedo, J.C. (2019). Farmland abandonment decreases the fire regulation capacity and the fire protection ecosystem service in mountain landscapes. ECOSYSTEM SERVICES 36, 100908. doi: https://doi.org/10.1016/j.ecoser.2019.100908



Touriga Franca and Touriga Nacional can be discriminated from other 62 grapevine varieties using spectroscopy

Using leaves spectroscopic measurements (reflectance) collected in situ and machine learning algorithms with a huge sampling collection, allowed to efficiently distinguish Touriga Franca and/or Touriga Nacional samples from other grapevine varieties.

Fernandes, A.M., Utkin, A.B., Eiras-Dias, J., Cunha, J., Silvestre, J., Melo-Pinto, P. (2019). **Grapevine variety identification using "Big Data" collected with miniaturized spectrometer combined with support vector machines and convolutional neural networks.** COMPUTERS AND ELECTRONICS IN AGRICULTURE 163, 104855. doi: https://doi.org/10.1016/j.compag.2019.104855

Water deficit enriches almond hulls on antioxidant compounds

Availability of water was shown to change the (poly)phenols concentration on almond byproducts, with deficit regimes increasing extracts antioxidant and antimicrobial actions.

Prgomet, I., Gonçalves, B., Domínguez-Perles, R., Santos, R., Saavedra, M.J., Aires, A., Pascual-Seva, N., Barros, A. (2019). *Irrigation deficit turns almond by-products into a valuable source of antimicrobial (poly)phenols*. INDUSTRIAL CROPS AND PRODUCTS 132, 186-196. doi: https://doi.org/10.1016/j.indcrop.2019.02.024



peer reviewed articles published (an average of 2.1 articles/integrated member), **304** communications in international and national events, **20** books and book chapters, and **5** publications in specialized technical

1 patent

magazines and 1 patent. CITAB researchers also supervised/co-supervised **14** completed PhD theses.

545

201 peer reviewed articles published

In 2019, the Centre scientific

productivity was significant, with 201

304 communications in events 20 books and book chapters 14 completed PhD theses

5 publications in magazines

Aires, A., Neuman, M., Ludwig-Müller, J., Schöpe, M., van Pée, K.H. (2019). Induced production of indol-3-ylmethyl glucosinolates in hairy roots of Chinese cabbage (Brassica rapa subsp. pekinensis), perspectives to enhance the content of bioactive compounds. ACTA HORTIC 1242, 49-56 doi: 10.17660/ActaHortic.2019.1242.7 (Q4).

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Alves-Pimenta, S., Ginja, M., Colaço, B. (2019). **Role of Elbow Incongruity in Canine Elbow Dysplasia, Advances in Diagnostics and Biomechanics.** VET COMP ORTHOP TRAUMATOL 32(02), 87-96. doi:10.1055/s-0038-1677513 (I.F, Q.: 0,810, Q3).

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COMPLETED PHD THESES

VISIT US

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This work is supported by national funds by FCT - Portuguese Foundation for Science and Technology, under the project UIDB/0433/2020





