3rd ONLINE CONFERENCE

25 oct 2023

CIRCULAR ECONOMY: MAKE IT HAPPEN

CONFERENCE BOOK

SWYP
Smart Waste
Young Professionals

SWYP ONLINE CONFERENCE

The Smart Waste Young Professionals Online Conference aims to promote circular economy principles on young professionals committed to research and innovation towards sustainable solid waste management and circular economy.

The event is organized annually by the Research and Innovation (R&I) working group.

WHAT IS THE MAIN FOCUS OF THE CONFERENCE?

The focal point of the SWYP Online Conference were themes concerning forward-thinking approaches for sustainable futures, including advancements in the Blue Economy, Bioactive Compounds, Waste Transformation, and Heritage Preservation, as well as Transformative Strategies in Bioactive Compounds from Agricultural By-Products leading to the transformation of waste into wealth. This is highlighted by a special emphasis on the circular economy.

Underlining the urgency of addressing contemporary challenges, the conference seeks to underscore the importance of adopting sustainable practices to pave the way for a more sustainable future.

By disseminating innovative ideas and approaches, the event aims to encourage the adoption of practical measures that can contribute to a more sustainable and environmentally conscious society.

WHAT IS THE AIM OF THE CONFERENCE?

The main focus of the conference lies in fostering an active exchange of knowledge within the national scientific and technological community. Emphasizing the importance of disseminating new research and scientific discoveries in different technological areas, the conference aims to highlight the pivotal role of collaborative efforts in discovering solutions for a more resilient, circular, and regenerative future.

A key emphasis of the conference is on recognizing the instrumental role that young researchers can play in shaping the trajectory of our future. By empowering and engaging young minds, the conference aims to inspire a new generation of leaders and visionaries who can drive transformative changes in various scientific and technological domains.

Smart Waste Young Professionals firmly believe in the significance of providing fellow young researchers with a platform to share and advocate their scientific breakthroughs, particularly those that hold the potential to advance environmental quality.

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MESSAGE FROM THE CONFERENCE CHAIR

Circular Economy plays a fundamental role in building a more sustainable and regenerative future, by promoting the intelligent use of resources, waste reduction, and the creation of more equitable and environmentally conscious economic systems.

Circular Economy is no longer seen as a far-fetched concept, a buzzword, an obligation. It has increasingly been seen as an opportunity and is a fundamental concept in national and European strategies.

Portugal has great examples of circular economy practices, and the Portuguese research community is deeply committed to innovating in this field and paving the way for a more sustainable future.

Today, we recognize the vital role that young people play in building a more resilient, sustainable, and regenerative future and, as you will see throughout the session, young researchers in this field have therefore a golden opportunity and an unprecedented mission to make circular economy happen.

The 3rd SWYP Online Conference was a resounding success, taking place on the 25th of October 2023 under the theme "Circular Economy: Make It Happen". This conference represents one of SWYP's most notable activities since the group's creation, and it was the stage for countless young researchers, all over the years, whose work has been an inexhaustible source of inspiration and motivation for all of us.

The Conference included presenting 11 high-quality works produced in Portugal by young researchers (≤ 35 years old). These works were selected through a highly competitive call for abstracts, video-pitch, and public presentations. Congratulations to the authors of the three best works. These authors were awarded prizes to support their professional development.

The SWYP Online Conference was organized by a committee of 18 young professionals working in 16 different entities who gave their best efforts to create an enriching conference. We want to thank the conference sponsors, LIPOR and Municipality of Mafra, for their commitment to supporting young professionals in making the circular economy a reality and for making this Conference possible. We congratulate the Conference Committee, the speakers, and all participants for making this event a success and for providing an exciting showcase of the best circular economy research done by young professionals in Portugal.

This event provided a unique platform for sharing experiences and knowledge among young professionals.

INÊS GOMES

(Smart Waste Portugal)
Conference Chair I Chair of Smart Waste Young Professionals

MESSAGE FROM SMART WASTE PORTUGAL

In March 2020, Smart Waste Portugal was challenged to create Smart Waste Young Professionals. This is a group aimed at young professionals, aged 35 years old or under, who have professional activity or are interested in the theme of circular economy. It is a very diverse group oriented towards the entire value chain, which aims, among other things, to support SWP, as well as its members, within the Association's mission.

During its two first years of existence, SWYP has revealed itself as an armed wing of Smart Waste Portugal, contributing to the most diverse themes, in which knowledge, experiences, and skills improvement are shared, so relevant these days.

Circular economy, the motto of this conference, is a key element to promote the decoupling between economic growth and the increase in resource consumption and the production of waste. Innovation is the motto for the transition to a more circular economy and should be seen as an opportunity for companies/industry to be at the forefront of new solutions and to be resilient regarding change.

The importance of sharing knowledge between universities, technology centers, and companies cannot be overstated. It is through these dynamic alliances that breakthroughs are nurtured, ideas are refined, and groundbreaking solutions to real-world challenges are born. Let us seize this opportunity to bridge the gap between academia and industry, uniting our collective wisdom to shape a brighter future for Portugal and beyond.

So, I would like to close by saying that it is an honor to be able to be a part of this 3rd edition of the SWYP conference, and that together, we shall continue to march forward, making "Circular Economy: Make It Happen" a guiding principle in our pursuit of a cleaner, greener, and more sustainable planet.

LUÍSA MAGALHÃES
(Smart Waste Portugal)

MESSAGE FROM THE KEYNOTE SPEAKER

TECHNOLOGICAL ADVANCEMENTS FOR SUSTAINABILITY

PEDRO NORTON DE MATOS
Greenfest, Bluefest Portugal and Academia G

SHORT BIOGRAPHY

Has a degree in Organization and Business Management from ISCTE. He was CEO at Unisys Portugal, Spain, and Italy and at the operator ONI. He was also a non-executive director of Inapa, founding partner of MyChange and INCIRCLE and member of the Advisory Board of Oracle Ibérica.

He is the founder and organizer of Greenfest and Bluefest and Partner of the Gingko Group. He is also the organizer of Fórum Expresso XXI, founding partner of Verde Movimento, member of the advisory board of Fábrica de Start-ups and consultant in transformational change and Coaching.

TAKEAWAY MESSAGE

Technological advancements for sustainability encompass innovative solutions and applications aimed at mitigating environmental challenges, promoting resource efficiency, and fostering a harmonious coexistence between technology and the planet.

Young researchers in Portugal are at the forefront of advancing sustainability through innovative technologies, with a particular focus on promoting the circular economy, signaling a promising trajectory towards a more environmentally conscious and resilient future.

MESSAGE FROM THE KEYNOTE SPEAKER

INTERDISCIPLINARY INNOVATION BUILDING THE FUTURE THROUGH COLLABORATION

JOÃO NUNES
Associação BLC3 - Campus de Tecnologia e Inovação

SHORT BIOGRAPHY

Has a degree in Mechanical Engineering (University of Coimbra), a master's in mechanical engineering (University of Coimbra) and PhD in Biosciences (University of Coimbra and Institute of Catálysis and Petróeleoquimica). He is the Founder, President and CEO of BLC3 (Technology and Innovation Campus) and President of CECOLAB (Collaborative Laboratory for the Circular Economy). He also has got a lot of experience in the areas of bioeconomy and circular economy, coordinating several projects regarding these areas.

TAKEAWAY MESSAGE

Interdisciplinary innovation propels the future by fostering collaborative endeavors across diverse fields, leveraging collective expertise to address complex challenges and create transformative solutions. It is, for this reason, essential to ensure that industry and academia work side by side in the search for the best solutions available on the market.

Within this conference, young researchers in Portugal showcased the power of interdisciplinary innovation at this conference, emphasizing collaborative efforts across diverse fields to propel the future, with a specific focus on circular economy solutions.

MESSAGE FROM THE INVITED SPEAKER

BIOREBOOT

THIAGO GOMES
BioReboot

SHORT BIOGRAPHY

Thiago is the CEO of BioReboot, a Madeiran startup focused on circular economy, environmental education, and new product development. He has a degree in Organic Agriculture from the Higher School of Management and Technologies of the University of Madeira and is a natural curious person, never passing up a good conversation where he can learn and share knowledge linked to sustainability and entrepreneurship. He is also a member of Smart Waste Young Professionals.

TAKEAWAY MESSAGE

BioReboot is a startup, based in the Autonomous Region of Madeira, focused on Research & Development of New Products aligned with the pillars of the Circular BioEconomy, also having an Environmental Education aspect. Currently, it is focused on replacing the disposable plastic used in the Agricultural sector through a biocomposite developed from agricultural waste. Thiago Gomes, CEO of BioReboot, believes that the transition from single-use plastic to more sustainable materials is, in addition to being possible, absolutely necessary and that this movement must be constantly combined with raising awareness through the education of consumers and companies.

CONFERENCE COMMITTEE

→ CHAIR

INÊS GOMES

ASWP

→ SECRETARY

CRISTIANA RIBEIRO

ASWP

→ SCIENTIFIC COMMITTEE COORDINATOR

DIOGO PROENÇA

University of Coimbra, Department of Life Sciences and CEMMPRE

→ CONFERENCE SESSIONS COORDINATOR

MARTA COELHO

CBQF - Universidade Católica Portuguesa

SCIENTIFIC COMMITTEE

→ **ALEXANDRE LIMA**

GreenCoLab—Oceano Verde Association, University of Algarve

→ **DIOGO PROENÇA**

University of Coimbra, Department of Life Sciences and CEMMPRE

→ **EZEQUIEL COSCUETA**

CBQF
Universidade Católica Portuguesa

→ **GUILHERME ASCENSÃO**

RISCO, Department of Civil Engineering, University of Aveiro

→ **JOSÉ TIAGO CARVALHO**

CENIMAT/i3N - Nova FCT

→ **MARTA COELHO**

CBQF - Universidade Católica Portuguesa

→ **SANDRA NETO**

Recauchutagem Nortenha

→ **TELMA SILVA**

Nalanda Global

CONFERENCE SESSIONS MODERATORS

→ **MARGARIDA MENDES**

Aliados Consulting

→ **MARTA COELHO**

CBQF - Universidade Católica Portuguesa

CONTENT DEVELOPERS

ANA CAROLINA SOARES

PIEP - Centre for Innovation in Polymer Engineering

CAROLINA DUQUE

E-cycle - Associação de Produtores de EEE

GUILHERME ASCENSÃO

RISCO, Department of Civil Engineering, University of Aveiro

INÊS GOMES

ASWP

PROMOTION AND MARKETING

ANA CACHINHOS

PIEP - Centre for Innovation in Polymer Engineering

ANA CAROLINA SOARES

PIEP - Centre for Innovation in Polymer Engineering

CATARINA CACHEIRA

Matosinhos Municipality

JORGE GONÇALVES

Magellan Circle

JOSÉ TIAGO CARVALHO

CENIMAT/i3N - Nova FCT

MARTA COELHO

CBQF - Universidade Católica Portuguesa

SANDRA NETO

Recauchutagem Nortenha

TELMA SILVA

Nalanda Global

PROGRAM

3rd ONLINE CONFERENCE | 25 oct 2023

CIRCULAR ECONOMY: MAKE IT HAPPEN

09:00 **OPENING SESSION**

Luísa Magalhães — Smart Waste Portugal
Inês Gomes — Smart Waste Young Professionals

09:15 **TECHNOLOGICAL ADVANCEMENTS FOR SUSTAINABILITY**

Keynote-Speaker
Pedro Norton de Matos,
Greenfest, Bluefest Portugal and Academia G

09:30 **SESSION 1:**
Innovative Solutions for Sustainable Futures: Advancements in the Blue Economy, Bioactive Compounds, Waste Transformation, and Heritage Preservation

MODERATION: Margarida Natal Mendes, Aliados Consulting

- Clean Recovery of Phenylethyl Isothiocyanate from Watercress By Products: Optimising a Solvent-Free Extraction Approach
  Ana Sofia Sousa
- Transforming multilayer plastic waste into good quality resource
  Anareth Cavuquila
- Donnan dialytic transport and biological removal of yttrium from synthetic AMD solutions
  Carina Coimbra
- Unlocking the potential of codfish skin-derived collagen hydrolysates for gastrointestinal delivery
  Isa Silva
- Sustainable growth of the blue economy in Portugal – The Blue Project
  Ítala Marx
- Extraction of cellulose from brewery waste with a focus on circular economics: for heratige preservation
  Liliana Araújo

10:50 **ONLINE BREAK**

11:00 **INTERDISCIPLINARY INNOVATION: BUILDING THE FUTURE THROUGH COLLABORATION**

Keynote-Speaker
João Nunes,
Associação BLC3 - Campus de Tecnologia e Inovação

11:15 **WASTE AS A RESOURCE**
Thiago Gomes, BioReboot

11:25 **SESSION 2:**
From Waste to Wealth: Transformative Strategies in Bioactive Compounds from Agricultural By-Products

MODERATION: Marta Coelho,
Center for Biotechnology and Fine Chemistry - Universidade Católica Portuguesa

- Hesperidin-Rich Upcycled Ingredient from Orange Juice Side Streams: exploring its health benefits and role on circular economy
  Ana A. Vilas-Boas
- A Circular Approach to Explore the Nutraceutical Potential of Shiitake Mushroom By-Product
  Filipa Baptista
- Chemical and Bioactive Composition of Mushroom Biomass: Understanding their Nutritive and Health Value
  Helena Araújo-Rodrigues
- Grape stem polyphenol-based nanoparticles for by-product recycling and innovative targeted prostate cancer therapies
  Raquel Fernandes
- Unveiling the Cosmetic Potential of Winery By-Products
  Rui Dias Costa

12:30 **FINAL REMARKS**
Diogo Proença,
University of Coimbra - Department of Life Sciences and CEMMPRE

12:40 **CLOSING SESSION**

ABSTRACT COMPETITION

Smart Waste Young Professional has invited young professionals up to 35 years old developing work in Portuguese institutions to submit their abstract for the 3rd SWYP Online Conference titled "Circular Economy: Make It Happen".

All abstracts and complementary 45-60 s video pitches submitted were reviewed based on technical merit, scientific novelty, and relevance under the conference topics by the Conference Scientific Committee. The works had to be informative, stand alone in their content and meaning, and depict how circular economy approaches could be effectively implemented.

Efforts were made to give the chance to as many speakers as possible to attend the conference. 11 abstracts on several topics, representing the work of five different R&D institutions were addressed and selected for presentations combined in two conference sessions:

→ Innovative Solutions for Sustainable Futures: Advancements in the Blue Economy, Bioactive Compounds, Waste Transformation, and Heritage Preservation

→ From Waste to Wealth: Transformative Strategies in Bioactive Compounds from Agricultural By-Products

Awards were attributed to the three selected research works, considering the quality and clarity of the abstract, video pitch, and Conference presentation.

ABSTRACT TOPIC:

INNOVATIVE SOLUTIONS FOR SUSTAINABLE FUTURES:

ADVANCEMENTS IN THE BLUE ECONOMY, BIOACTIVE COMPOUNDS, WASTE TRANSFORMATION, AND HERITAGE PRESERVATION

Moderator:
Margarida Natal Mendes

- **Transforming multilayer plastic waste into good quality resource**
  Anareth Cavuquila
- **Clean Recovery of Phenylethyl Isothiocyanate from Watercress By Products: Optimising a Solvent-Free Extraction Approach**
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  Liliana Araújo

ANARETH CAVUQUILA

→ I am Anareth Cavuquila, a M.Sc. Chemical Engineer. Currently, I am immersed in an exciting journey as a doctoral candidate at the University of Aveiro, where my research focuses on multilayer plastic waste valorization. The understanding that my research is essential to addressing one of the most urgent environmental issues ignites my passion and dedication.

TRANSFORMING MULTILAYER PLASTIC WASTE INTO GOOD QUALITY RESOURCE

Anareth Cavuquila [a],*, Maria Inês Portugal [a], Carlos Manuel Silva [a], Ana Barros- Timmons[a]

[a]CICECO - Aveiro Institute of Materials, Department of Chemistry, University of Aveiro, 3810-193 Aveiro, Portugal.
*Corresponding author: 0000-0002-8350-4794; 1995; anareth@ua.pt; 960076661.

Plastic pollution has reached alarming levels, with a staggering 8300 million metric tons of plastic produced globally and approximately 59 % of it being disposed into the environment (Jubinville et al., 2020). Multilayer plastic packaging presents a substantial challenge due to its complex composition, rendering traditional recycling methods ineffective among the various forms of plastic waste. Consequently, this waste stream ends up in incineration, landfills, or polluting natural ecosystems.

To address this issue, researchers have explored innovative solutions, such as the selective dissolution and precipitation technique, for separating multilayer plastic packaging waste based on solubility in different solvents. However, this technique has primarily been applied to low-contaminant post-industrial waste. In our study, we leveraged the potential of dissolution and precipitation for recycling a complex mixed multilayer plastic packaging waste stream.

Our research centered on a post-consumer mixed multilayer plastic packaging waste sample composed of polyethylene (PE) and polyethylene terephthalate (PET), with minor quantities of polypropylene (PP), polyamide (PA), and various contaminants, including aluminum, plasticizers, colorants, paper, and plastic additives. Toluene served as the solvent for dissolving the waste material, resulting in the recovery of a polyethylene-rich material with high purity. On average, we successfully recovered 42.0 wt.% of the initial multilayer plastic packaging waste through this process.

Furthermore, we assessed the feasibility of reusing the recovered material by incorporating it into virgin matrices and evaluating the thermal and mechanical properties of the ensuing blends. Impressively, the blends exhibited good compatibility, and when the recovered polymeric material was integrated into low-density polyethylene (LDPE), the mechanical properties showed significant enhancement, with optimal improvements observed at 50 % incorporation and excellent processability.

This research provides promising insights into the efficient recycling of complex multilayer plastic packaging waste, contributing to a more sustainable approach to plastic management and mitigating environmental pollution.

Keywords: multilayer packaging, plastic recycling, selective dissolution and precipitation, circular economy

ANA SOFIA SOUSA

→ Sofia Sousa is a pharmacist and has been a PhD student at ESB-UCP and i3S/Ipatimup in Biotechnology since March 2022, working on engineering a multifunctional microparticle targeting colon inflammation (PhD FCT grant). She also works for a national project (gBIOT). Since 2019, Sofia has been a CBQF researcher at the Bioactives and Bioproducts Research Laboratory. Her scientific career started as a research fellow in a MicoBioExtract project, then in the GASTROCURE project and a European project (FODIAC). She has published over five articles and book chapters and presented research at international conferences (oral and poster communications). Her main research interests have been Health Sciences, Pharmacy, Biotechnology, Nanotechnology, Microbiology, Microbiota, Bioproducts, Pharmaceutical and Nutraceutical Products.

Steve Jobs said, "The only way to do great work is to love what you do. If you haven't found it yet, keep looking. Don't settle". This is the motto that inspires and motivates Sofia personally and professionally.

Clean Recovery of Phenylethyl Isothiocyanate from Watercress By Products: Optimising a Solvent-Free Extraction Approach

Ana Sofia Sousa[1,2,3]*, Ezequiel R. Coscueta[1], Celso A. Reis[2,3,4] and Manuela Pintado[1]

[1]CBQF—Centro de Biotecnologia e Química Fina—Laboratório Associado, Escola Superior de Biotecnologia, Universidade Católica Portuguesa, Rua Diogo Botelho 1327, 4169-005 Porto, Portugal
[2]i3S—Instituto de Investigação e Inovação em Saúde, Universidade do Porto, 4200-135 Porto, Portugal;
[3]Institute of Molecular Pathology and Immunology of University of Porto, Ipatimup, 4200-135 Porto, Portugal
[4]Medical Faculty, University of Porto, Al. Prof. Hernâni Monteiro, 4200-319 Porto, Portugal
*Corresponding author: 0000-0002-9854-0253; 1995; assousa@ucp.pt; +351 918 037 547

Gastrointestinal diseases affect up to 40% of the global population, causing significant morbidity, mortality, and economic burden[1,2]. Hence, novel approaches are needed to control these diseases. In this sense, certain phytochemicals have shown therapeutic and preventive effects on multiple chronic conditions and cancer[3,4]. This includes isothiocyanates (glucosinolates breakdown products) from cruciferous vegetables. Phenylethyl isothiocyanate (PEITC), a major isothiocyanate of watercress, exhibits potential antioxidant, anti-inflammatory, and anticancer effects[5,6].

It is important to find techniques to improve the recovery of PEITC to overcome natural uptake limitations. However, conventional extractions use polluting organic solvents. Besides, the few works on green extraction apply complex, expensive, and challenging-to-scale techniques5. Further research on obtaining PEITC from watercress, mainly using by-products and clean extraction, aligns with Goal 12 of the 2030 Agenda. On this point, microwave gravity hydrodiffusion (MHG) is a promising and scalable solvent-free technique[7] for PEITC recovery. There is no information about this matter, which opens an opportunity for an interesting analysis.

The present work is based on the following research questions: is MHG suitable for PEITC extraction, comparable to currently used techniques? What are the variables that most affect the extractive process? What are the optimal extraction conditions?

Therefore, we optimised the MHG extraction process by response surface methodology. As an alternative to using organic solvents, the developed protocol allows for PEITC extraction, resulting in 1818 µg PEITC/g watercress d.b., compared to 1682 µg PEITC/g watercress d.b. using n-hexane5. Notably, the extraction occurred without pretreatment of the raw material or solvent, which offers a significant advantage. Moreover, we analysed other response variables: extraction yield, total phenolic compounds, and antioxidant capacity (ABTS and ORAC assays). The optimal extracts showed antioxidant capacity, and ferulic acid was one of the main phenolic compounds. Thus, the MHG process provides a sustainable alternative for extracting PEITC from discarded watercress.

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Keywords: Phenylethyl isothiocyanate (PEITC); Microwave gravity hydrodiffusion (MHG); Sustainable extraction; Watercress by-products; Response surface methodology

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CARINA COIMBRA

→ My name is Carina Coimbra and I have completed my Bachelor degree in Biochemistry in 2013 by Faculty of Sciences of the University of Beira Interior and then my Master degree in Biochemistry, in 2015 by Faculty of Science and Technology of the University of Coimbra. Published 4 articles in journals. Organized 1 event. Participated in 7 event(s). I am currently a PhD student at the University of Coimbra, conducting my research in the field of environmental microbiology and bioremediation. The creation of a biological tool (biotool), more resistant and economic, in the removal of metal from contaminated sites (bioremediation) is my main objective.

Donnan dialytic transport and biological removal of yttrium from synthetic AMD solutions

Carina Coimbra[1], Svetlozar Velizarov[2], Rita Branco[1], Paula Vasconcelos Morais[1] and João G. Crespo[2]

[1] University of Coimbra, Centre for Mechanical Engineering, Materials and Processes, Department of Life Sciences, Coimbra, Portugal.
[2] LAQV-REQUIMTE, Department of Chemistry, NOVA School of Science and Technology, FCT NOVA, Universidade NOVA de Lisboa, 2829-516 Caparica, Portugal

Agro-food industry generates large lignocellulosic wastes. Yttrium (Y) belongs to the rare earth elements (REEs) together with lanthanides and scandium. Y and REEs are commonly used in modern technologies, and their limited supply has made it necessary to search for alternative resources. In addition to increasing acidity, several elements of economic interest are released into the environment due to the extraction and processing of mineral resources, which makes acid mine drainage (AMD) a potential strategic secondary source of these elements, as it is moderately REE-enriched.

The recovery of Y from a synthetic acid mine drainage (SAMD) solution by Donnan dialysis has been investigated. The present study proposes the application of a cation- exchange membrane (CEM) transport coupled with biological treatment for the transport and recovery of Y from secondary sources in two subsequent stages. The efficiency of Y transport was evaluated regarding the initial concentration of Y and the counter-ions concentrations in both feed and receiver (stripping) solutions. The effect of pH variation and concentration of NaCl in the receiver solution on the Donnan dialysis process efficiency was also studied. After optimizing the experimental conditions of the 1st transport stage, the effect of the presence of accompanying cations present in different concentrations, as possible competing counter-ions, was investigated. To recover the Y transported across the membrane, the 2nd stage consisted of the addition of the strain J19 (characterized as highly resistant and Y-accumulating) to the receiver compartment.

It was found that the Y^{3+} ion was successfully transported across the acid-resistant CEM, achieving an efficiency of 68.61%, even in the presence of accompanying cations. Adding strain J19 resulted in removing about 89% of the Y that was initially present in the feed compartment.

The coupled CEM transport/biological concept represents a novel Y treatment technology with minimal generation of contaminated waste (allowing the separation of cation metals from sulfate), thereby reducing the overall environmental impact of the process.

Keywords: yttrium recovery, acid mine drainage, cation-exchange membrane, donnan dialysis, critical raw materials

ISA SILVA

→ Hi, my name is Isa. I graduated from the University of Aveiro with a BSc in Biochemistry and an MSc in Food Biotechnology. I'm currently engaged in a project at Universidade Católica Portuguesa that focuses on food waste-based biomaterials for the footwear industry. Since my master's degree and working with bioactive peptides from codfish skins, I have been pursuing my passion for food waste valorization for biomedical applications. In the next years, I hope to keep developing a career in Biotechnology research and exploring different bioactive compounds for health applications.

UNLOCKING THE POTENTIAL OF CODFISH SKIN-DERIVED COLLAGEN HYDROLYSATES FOR GASTROINTESTINAL DELIVERY

Silva I.,[a] Pintado M.,[a] and Coscueta E.[a]*

[a] Universidade Católica Portuguesa, CBQF - Centro de Biotecnologia e Química Fina – Laboratório Associado, Escola Superior de Biotecnologia, Rua Diogo Botelho 1327, 4169-005 Porto, Portugal

*Corresponding author: 0000-0002-2976-4472; 1999; isilva@ucp.pt; 928025304.

The fishing industry currently generates significant amounts of by-products, such as heads, skins, bones, and scales, typically used for fish oil or meal production. However, these neglected parts can be valuable sources of collagen, a ubiquitous protein found in various organisms and tissues. Enzymatic hydrolysis can release bioactive peptides with interesting properties from collagen for nutraceutical applications. In this study, we extracted native collagen using a eutectic solvent mixture of urea and propanoic acid (U:PA; 1:2) (extraction yield: 2.2%) from codfish skins. Alcalase hydrolysis for 120 min released bioactive collagen peptides with antioxidant (961 µmol TE) and antihypertensive activities (39.3% of inhibited ACE). We encapsulated approximately 39.3% of the hydrolysates in chitosan capsules to maintain the bioactivities throughout the gastrointestinal tract. An in vitro gastrointestinal tract simulation allowed us to assess the release of peptides and the effect of digestion on the hydrolysates. The results showed that capsules with U:PA-based peptides released approximately 58% of their content, mainly during the intestinal phase. Although the action of enzymes in the simulated gastrointestinal tract did not significantly alter the size profile of collagen hydrolysates, their bioactivities underwent alterations. Therefore, encapsulation proves to be a suitable alternative for the application of these peptides as possible nutraceuticals.

Keywords: codfish skins, deep eutectic solvents, marine collagen, bioactive peptides, colon delivery

ÍTALA MARX

→ I am PhD in Pharmaceutical Sciences with specialty in Nutrition and Food Chemistry. During my career, I have been acquiring skills in the field of food science and technology by exploiting natural matrices in terms of chemical characterization, bioactive evaluation, and extraction processes. The objective has been to extract high-value molecules and reintroduce them into the food chain, from agriculture to the end consumer. During my postdoctoral research at the Mountain Research Centre, I developed a natural solution based on bioactive compounds extracted from plant by-products and biowaste against grapevine diseases. Currently, I am postdoctoral researcher at Centre of Biological Engineering - University of Minho on the Blue Project (PT-INNOVATION-0105). My research activity resulted in the publication of 26 scientific contributions, participation in several scientific events with oral presentations, and the distinction of EuChemS FCD Young Researcher Award 2023.

SUSTAINABLE GROWTH OF THE BLUE ECONOMY IN PORTUGAL – THE BLUE PROJECT

Ítala Marxa,[b]* Joana T. Martins [a,b], Fernanda L. Ludtke [a,b], Jorge M. Vieira [a,b], António A. Vicente [a,b]

[a] Centre of Biological Engineering (CEB), University of Minho, Portugal
[b] LABBELS Associate Laboratory, Braga/Guimarães, Portugal
*Ítala Marx: 0000-0002-7049-2114; 1991; itala_marx@hotmail.com; +351 964489853

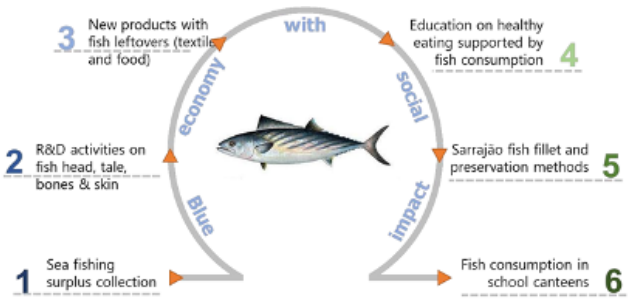
The Blue Project - Bioeconomy, PeopLe, SUstainability, HEalth (Figure 1) presents an innovative strategy centered around bioeconomy, sustainability, health, and community involvement with a strong emphasis on quality, equitable distribution, and value addition.

The project's foundation lies in fostering a direct partnership with fishing communities and local authorities for the Atlantic Bonito sustainable catch. Moreover, sustainable food education is a paramount objective of the Blue Project. Recognizing the erosion of society's connection with the food they consume, the project aims to empower the younger generation with knowledge about healthier eating practices. This educational outreach is intended to transform children into well-informed and highly engaged advocates for sustainable food choices.

Blue Project presents a multi-pronged approach which considers several objectives: (i) exploring underutilized Atlantic Bonito fish resources, to deliver fillets to the market and school canteens; (ii) extracting new raw materials from fish by-products; (iii) developing textile-based materials incorporating waste resources generated during Atlantic Bonito processing; (iv) creating novel food products using fish by-products as a sustainable raw material source; and (v) engaging, educating, and empowering the next generation to foster healthy and sustainable food habits. Essentially, the project envisions a future where bioeconomy, sustainability, and healthy food practices converge to benefit both the environment and society.

The project consortium is ensured by entities with complementary skills for the generation of scientific resources and technological knowledge, specifically, the University of Minho team actively works in the products based on 'Atlantic Bonito', as well as in the development of textile-based materials incorporating waste from the handling of 'Atlantic Bonito' fish.

By harnessing the potential of the Atlantic Bonito and fostering community involvement, this project serves as a model for environmentally conscious initiatives aimed at creating a more sustainable future.
development and optimization of new



Keywords: Bioeconomy; Sustainability; Atlantic Bonito Fish; Food Education; Community Engagement

LILIANA ARAÚJO

→ In 2018, Liliana completed her BSc in Biotechnology at the Polytechnic Institute of Viana do Castelo, with a final project entitled "Evaluation of methodologies for the extraction and characterisation of woods from wine ageing". During this project, I worked in the Centre of Biological Engineering at University of Minho to develop new methodologies to minimise the costs and time of aromatisation of Port Wine. I finished my MSc in Applied Biochemistry, at the University of Minho. In 2022, I have been a research fellow in the project "HAC4CG - Heritage, Art, Creation for Climate Change. Living the city: catalysing spaces for learning, creation and action towards climate change" at the Catholic University of Porto. Also, currently, I was accepted to a research grant to be developed at Center for Biological Engineering at the University of Minho with the project: "Micro4Food - Upgrading fruit wastes for microbial protein production".

EXTRACTION OF CELLULOSE FROM BREWERY WASTE WITH A FOCUS ON CIRCULAR ECONOMICS: FOR HERATIGE PRESERVATION

Liliana Araujo[a], Adriana R. Machado[b], Manuela Pintado[c], Eduarda Vieira[d], Patrícia Moreira[e]

[a]Universidade Católica Portuguesa, Centro de Investigação em Ciência e Tecnologias das Artes (CITAR) Porto, Portugal and Universidade Católica Portuguesa, Centro de Biotecnologia e Química Fina (CBQF), Porto, Portugal lparaujo@ucp.pt, ,
[b]Collaborative Laboratory Towards Circular Economy (CECOLAB), Oliveira do Hospital, Portugal arma-chado@ucp.pt
[c]Universidade Católica Portuguesa, Centro de Biotecnologia e Química Fina (CBQF), Porto, Portugal
[d]Universidade Católica Portuguesa, Centro de Investigação em Ciência e Tecnologias das Artes (CITAR) Porto, Portugal, evieira@ucp.pt
[e]Universidade Católica Portuguesa, Centro de Investigação em Ciência e Tecnologias das Artes (CITAR) Porto, Portugal and Universidade Católica Portuguesa, Centro de Biotecnologia e Química Fina (CBQF), Porto, Portugal prmoreira@ucp.pt
*Corresponding author: 0000-0003-3439-8494; 1994; lparaujo@ucp.pt; 925 465 434.

The brewing industry is responsible for generating large amounts of solid waste. One of the by-products of great value that represents 85% of the waste of the brewing industry, the dreche (malt residue), comes to be the focus of this study, with its reuse advancing one of the principles of the circular economy, promoting solutions for the reduction and recovery of waste, therefore being increasingly a relevant issue in the valorization of by-products. Thus, this study aimed to evaluate cellulose extraction and characterize it. The cellulose extraction method was performed through an acid and alkaline hydrolysis and lastly bleaching. The extraction method obtained yields from 500 µm, 300 µm, 150 µm and retain fraction, of 13.98, 16.02, 11.63 and 7.03 %, respectively.

The extractions were performed in four fractions of dreche, in particles of 500 µm, 300 µm, 150 µm and retained. This extraction method of cellulose was efficient, confirmed by the Fourier transform with attenuated total reflectance (FT-IR) analysis. This allowed us to verify the vibrations of stretching and deformation of characteristic peaks representing the cellulose. In general, the data showed a typical peak of cellulose at 1200 cm-1 and a strong hemicellulose signal between 900 and 1200 cm-1, while at 1500 cm-1, the characteristic peaks of lignin were presented. Therefore, according to the results achieved, it is possible to obtain cellulose from waste from the brewing industry. The obtained cellulose will be used to create films in a sustainable and environmentally friendly technique for the preservation of heritage buildings from environmental conditions.

Keywords: By-products; acid hydrolysis; alkaline hydrolysis; FT-IR; malt.

ABSTRACT TOPIC:

FROM WASTE TO WEALTH:

TRANSFORMATIVE STRATEGIES IN BIOACTIVE COMPOUNDS FROM AGRICULTURAL BY-PRODUCTS

Moderator:
Marta Coelho

- **Hesperidin-Rich Upcycled Ingredient from Orange Juice Side Streams: exploring its health benefits and role on circular economy**
  Ana A. Vilas-Boas
- **A Circular Approach to Explore the Nutraceutical Potential of Shiitake Mushroom By-Product**
  Filipa Baptista
- **Chemical and Bioactive Composition of Mushroom Biomass: Understanding their Nutritive and Health Value**
  Helena Araújo-Rodrigues
- **Grape stem polyphenol-based nanoparticles for by-product recycling and innovative targeted prostate cancer therapies**
  Raquel Fernandes
- **Unveiling the Cosmetic Potential of Winery By-Products**
  Rui Dias Costa

ANA A. VILAS-BOAS

→ Ana A. Vilas-Boas has been a PhD student at the ESB-UCP since 2020, working on developing upcycled food ingredients from orange side-streams. She holds a B.Sc. in Biotechnology from the Polytechnic Institute of Coimbra (2016) and an MSc in Food Engineering from Portuguese Catholic University (2020). Her scientific career started in 2017 as a fellow researcher at CBQF, working on national and international projects to develop bioactive/functional ingredients through the valorisation of agro-food waste. She published 19 research/review articles in international journals and authored 8 chapters in handbooks, edited a book (ISBN: 9781774912959) about sustainable food by-products management and participated in more than 10 international conferences, she has an h-index of 9 with more than 408 citations. In addition, she participated in several entrepreneurship competitions (BfK, Circular for Good (C4G) and EIT Climate-KIC Accelerator). She won two awards (Ecotrophelia Portugal 2018 and Innovation Track 2018) with the Bean Ready Project.

HESPERIDIN-RICH UPCYCLED INGREDIENT FROM ORANGE JUICE SIDE STREAMS: EXPLORING ITS HEALTH BENEFITS AND ROLE IN CIRCULAR ECONOMY

Ana A. Vilas-Boas*, Débora A. Campos, Marta Correia and Manuela Pintado

Universidade Católica Portuguesa, CBQF - Centro de Biotecnologia e Química Fina – Laboratório Associado, Escola Superior de Biotecnologia, Rua Arquiteto Lobão Vital 172, 4200-374 Porto, Portugal
*Corresponding author: 0000-0002-9051-8123; 1995; avboas@ucp.pt; +351 916 833784

The upcycled ingredients have gained attention regarding their potential to enhance the food industry's circular economy and meet the demands of a health-conscious society. Orange juice production generates about 50% of side streams, including orange peels and pulps (OP). OP can provide sustainable raw material for novel bio-based and upcycled ingredients due to their flavonoid-richness, which has been linked with non-communicable diseases prevention (cancer, diabetes). Moreover, hesperidin also showed a potential gut microbiota modulation that inhibits pathogens and promotes probiotic bacteria growth. The main objective of this study was the optimisation of hesperidin-rich extraction using the Box-Behnken design and evaluate the potential bioactivities (antioxidant, antimicrobial, prebiotic, antidiabetic, and antihypertensive) in the final dried extract (DE).

The statistical analysis indicated that the proposed model was statistically significant ($p > 0.05$) for describing the hesperidin extraction conditions and under optimal conditions, the recovery of hesperidin was 0.84 ± 0.01 mg/g, fresh basis. This sustainable extraction was scaled up, and the electrospraying assisted by pressurised gas (EAPG) was used for drying the extract since the EAPG showed a competitive advantage of drying without any adjuvant (e.g. maltodextrin). The DE showed 5.95 ± 0.11 and 3.60 ± 0.09, mg/g DE of hesperidin and narirutin, respectively. The hesperidin-rich extract has been proven to have AOX, antidiabetic and antihypertensive properties and, at 1% (m/v), it inhibited about 60% of the growth of Methicillin-Sensitive Staphylococcus aureus, Enterococcus faecalis, Listeria monocytogenes and Salmonella enterica. It also showed prebiotic activity with 2% (m/v) for the growth of Akkermansia muciniphila, Lacticaseibacillus casei, and Bifidobacterium animalis BB-12.

In summary, the results showed that hesperidin-rich ingredient could positively impact the prevention of non-communicable diseases. Furthermore, it is a promising economic bio-based ingredient for implementing a circular economy in citrus juice industries, which aligns well with the Sustainable Development Goals and the European Green Deal.

Keywords: orange; side-streams; sustainability; hesperidin; bioactivities.

Acknowledgements: The authors would like to thank the MEDISMART project (reference PRIMA/0014/2019) for financial support and the scientific collaboration of CBQF under the FCT project UIDB/Multi/50016/2020. In addition, the author Ana A. Vilas-Boas would like to acknowledge FCT for the individual PhD grant (2020.05655.BD).

FILIPA BAPTISTA

→ Filipa Baptista is a dynamic young researcher with a passion for animal nutrition. At 24 years old, she has earned a master's degree in animal science from the University of Trás-os-Montes e Alto Douro (UTAD). Filipa's research in the field of animal nutrition demonstrates her commitment to advancing the understanding of how nutrition impacts the health and well-being of animals. Her work holds the promise of improving animal welfare and enhancing the sustainability of livestock production. With her dedication to the field and a bright future ahead, Filipa Baptista is poised to make valuable contributions to the world of animal science.

A CIRCULAR APPROACH TO EXPLORE THE NUTRACEUTICAL POTENTIAL OF SHIITAKE MUSHROOM BY-PRODUCT

Filipa Baptistaa*, Joana Campos[a], Valéria Costa-Silva[b], Ana Rita Pinto[a], Maria José Saavedra[a], Luís Mendes Ferreira[a], Miguel Rodrigues[a] and Ana Novo Barros[a]

[a] CITAB—Centre for the Research and Technology of Agro-Environmental and Biological Sciences, CITAB, University de Trás-os-Montes e Alto Douro, UTAD, 5000-801 Vila Real, Portugal.
[b] CECAV—Animal and Veterinary Research Centre, University of Trás-os-Montes and Alto Douro, Quinta de Prados, 5000-801 Vila Real, Portugal.
*Corresponding author: 0009-0007-4448-2696; 1999; filipabaptista859@gmail.com; 933278406.

Lentinula edodes, or shiitake mushroom, is a major global mushroom supply. However, the growing demand for higher nutrition standards has increased mushroom production, leading to significant waste, notably spent mushroom substrate (SMS). This study investigated SMS's nutraceutical properties.

The SMS samples were collected and submitted to different extraction methods. The extracts were tested for phenolic content (total phenols, ortho-diphenols and flavonoids), antioxidant capacity (DPPH, ABTS and FRAP), and antibacterial activity.

The extracts from different extraction methods revealed substantial variations ($P<0.05$) in phenolic composition and antioxidant capacity. The highest phenolic content and antioxidant capacity resulted from ethanol extraction at 50°C with 24-hour agitation: total phenols - 271.09 ± 9.61 mg CAT g^{-1}, ortho-diphenols - 108.22±3.88 mg CAT g^{-1}, flavonoid content - 43.40±5.86 mg CAT g^{-1}, ABTS - 0.458±0.036 mmol g^{-1}, DPPH - 0.391±0.033 mmol g^{-1}, and FRAP - 0.638±0.049 mmol g^{-1}. Additionally, the extracts displayed moderate antibacterial activity with minimal antagonistic effects when combined with antibiotics.

This study unveiled SMS health benefits, with an emphasis on its nutraceutical and prebiotic potential, aligning with the circular economy fundamental principles.

Keywords: *Lentinula edodes*; prebiotic supplementation; animal nutrition; valuable by-product resources; circular economy.

HELENA ARAÚJO-RODRIGUES

→ Helena Rodrigues's academic education includes BSc in Biochemistry and MSc in Applied Biochemistry-Biotechnology field, both at the University of Minho. Since 2018, Helena has been a researcher at CBQF in the Bioactives and Bioproducts Research group. She integrated into SerpaFlora and MobFood projects, working in microorganism selection, biochemical characterization, and byproducts valorization. Currently, she is a PhD student in Biotechnology at CBQF and i3S, working in food nutrition and health. Her PhD work focuses on the impact of mushroom nutrition on gut microbiota modulation, trying to understand its potential in neuroprotection for Alzheimer's and other neurodegenerative disorders. Helena authored 10 articles in international and 3 in national journals, 1 book chapter and 1 patent. She also authored over 20 oral and poster communications in scientific conferences. Her main interest areas are focused on the crosstalk between nutrition and health, specifically focusing on biotechnology, biochemistry, microbiota modulation and bioproducts research.

CHEMICAL AND BIOACTIVE COMPOSITION OF MUSHROOM BIOMASS: UNDERSTANDING THEIR NUTRITIVE AND HEALTH VALUE

Helena Araújo-Rodrigues[a,b]*, Ana Sofia Salsinha[a,b], Manuela Amorim[a], João B. Relvas[b,c], Freni K. Tavaria[a], Manuela Pintado[a]

[a] Centro de Biotecnologia e Química Fina – Laboratório Associado, Escola Superior de Biotecnologia, Universidade Católica Portuguesa/ Porto, Rua Diogo Botelho, 1327, 4169-005 Porto, Portugal.
[b] Glial Cell Biology, i3S-Instituto de Investigação e Inovação em Saúde, Universidade do Porto (UP), 4200-135 Porto, Portugal.
[c] IBMC—Instituto de Biologia Molecular e Celular, Universidade do Porto (UP), 4200-135 Porto, Portugal.
*Corresponding author: ORCID iD; birth year; email address; mobile phone.

Beyond interesting nutritional properties, mushrooms possess numerous bioactive compounds involved in human health[1]. Distinct macromolecules are found in the mushroom mycelium and fruiting body. Mushroom biomass (MB) corresponds to the mycelium and young fruiting body (primordia). A synergetic effect between their different molecules has been proposed2. Additionally, the entire mushroom valorization may increase the economic value and minimize waste, contributing to a circular economy approach. To understand the MB nutritional value, the chemical and bioactive composition of three food and medicinal species was assessed for the first time, namely, *Coriolus versicolor* (CV), *Hericium erinaceus* (HE) and *Pleurotus ostreatus* (PO). The methodological approaches included: enzymatic kits for fiber and glucans quantification; inductively coupled plasma-optical emission spectrometry for mineral analysis; and gas-chromatography and high-performance liquid chromatography for other groups' quantification. No significant differences were found in total amino acids (AAs; 6.3-6.9%), α-glucans (71-78%) and β-glucans (3-5%) between species. Higher amounts of total (6.2%) and soluble proteins (2%), ash (1.5%), free sugars (1.2%) and free AAs (0.4%) were found in CV. Regarding HE composition, this had higher carbohydrates (93.1%), fat (1.8%), fiber (6.1%) and energy (382 kcal/ 100 g). The results of free and total AAs suggested that glutamic and aspartic acids, arginine, alanine and leucine were the most prevalent. Concerning mineral and fatty acid composition, the results indicated that the three species possessed very interesting profiles, being good sources of phosphorus, magnesium, calcium and potassium; and oleic, linoleic and α-linolenic acids. Moreover, a significant presence of other important bioactive groups that play important roles in human health was detected such as phenolics, carotenoids, and ergosterol in CV; and tocopherols in HE. The antioxidant capacity tests also suggested the high antioxidant potential of CV. These results demonstrated the high potential of these MBs to be used in human nutrition and health applications.

Keywords: Mushroom biomass; Nutritional characterization; Bioactive compounds; Human nutrition; Health benefits.

Acknowledgements: We would like to thank the National Funds from FCT - Fundação para a Ciência e a Tecnologia through project UIDB/50016/2020 and FCT individual PhD grant number 2020.05798.BD. The authors would also to thank Mycology Research Laboratories Ltd (Luton, UK) and Aneid - Produtos Farmacêuticos Lda (Cascais, Portugal) for providing mushroom biomass.

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RAQUEL FERNANDES

→ I am graduated at University of Minho. My master's in health sciences was focused on the role of glycogen synthase kinase-3 (GSK-3) inhibition in lung injury. From 2021-2022, I was an external collaborator of the Life and Health Sciences Research Institute (ICVS). I focused my research interests on immunobiological and regenerative mechanisms during homeostasis and under pathological conditions aiming to contribute to bringing new knowledge to therapeutic strategies available in lung diseases. From 2022-2023, I worked as a researcher in the Innovation and Development Department of Mesosystem S.A where I focused my research on the identification and extraction of functional molecules from microalgae and bioactive compounds from wine by-products and their implementation for cosmetics. Currently, I am a PhD student at University of Trás-os-Montes e Alto Douro (UTAD) with co-supervision of Fernando Pessoa University, where we are focused on nanoparticle targeted prostate cancer therapies using polyphenolic compounds.

GRAPE STEM POLYPHENOL-BASED NANOPARTICLES FOR BY-PRODUCT RECYCLING AND INNOVATIVE TARGETED PROSTATE CANCER THERAPIES

Raquel Fernandes[a],*, Rúben Fernandes[b], Ana Novo Barros[a]

[a] Centre for the Research and Technology of Agro-Environmental and Biological Sciences (CITAB),
Institute for Innovation, Capacity Building and Sustainability of Agri-Food Production (Inov4Agro),
University of Trás-os-Montes e Alto Douro, Quinta de Prados, 5000-801 Vila Real, Portugal.
[b] 2Faculty of Health Sciences (FCS) & Hospital Escola Fernando Pessoa (HEFP), University Fernando
Pessoa (UFP), 4249-004 Porto, Portugal.
*Corresponding author: 0000-0003-4764-2580; 20/11/1997; raquel.f.0018@gmail.com; 934267960.

Vitis vinifera (grapes) is one of the most consumed fruits in the world. Of the 73 million tonnes produced annually, 52% is used in the wine industry, which generates millions of by-products. Grape stems (GS) are rich in polyphenols, and studies demonstrated its potential in prostate cancer (PCa) by modulating cell cycle signalling, antioxidant enzymes and inhibiting cancer cell proliferation/growth. PCa is a leading cause of cancer morbidity and mortality. As PCa cells have high plasticity and heterogeneity, the percentage of therapy resistance and disease recurrence is very high. Additionally, chemical drugs used in chemotherapy and conventional radiotherapy cause severe side effects, contributing to high patient morbidity. These facts have increased interest in targeted cancer therapies. In this context, nanotechnology-delivery systems, including gold nanoparticles (AuNPs) as nanocarriers for polyphenols, have been widely used to increase the bioavailability of these compounds, reduce chemotherapy side effects, and improve organ delivery and radiotherapy resistance. Combining or even replacing conventional drugs with polyphenols offers the possibility of developing more efficient cancer therapies with fewer side effects for patients. The use of GS polyphenol-based AuNPs in PCa was never investigated. Therefore, we will use the millions of by-products generated from the winery industry in the Douro region to explore the potential of polyphenol-based AuNPs as therapeutic agents and radiosensitizers for PCa treatments. The phenolic compounds will be extracted and characterized from different wine varieties and selected for their best reducing, stabilizing and antioxidant properties. After green synthesis, AuNPs will be characterized and the best conditions to maximize their stability and activity will be selected to test their effects in *in vitro* and *in vivo* models of PCa. This project will uncover polyphenol-based AuNPs effect on PCa progression, radiotherapy resistance, and mitigation of side effects in PCa patients, contributing to by-product recycling and circular economy.

Keywords: prostate cancer; targeted therapies; gold nanoparticles; grape polyphenols; circular economy

RUI DIAS COSTA

→ I'm Rui Dias Costa, a PhD student in Chemical and Biological Sciences at the University of Trás-os-Montes and Alto Douro (UTAD). In 2012, I completed my Bachelor's degree in Food Science, finishing, in 2014, my Scientific Master's degree in Food Safety at Animal and Veterinary Research Centre (CECAV/UTAD).

Between 2015 and 2018, I was selected as a researcher with a fellowship work in R&D projects, namely Sambucus Fresh Project and Innovine & Wine Project, both funded by FEDER.

I participated in national and international congresses, with several communications in the form of posters and oral communications, winning an award for the best poster at one of the conferences. Recently, I published two articles in Foods journal (MDPI) and in Molecules journal (MDPI). At this moment the subject of my study is the valorisation of winery by-products for pharmaceutical and cosmetic purposes.

UNVEILING THE COSMETIC POTENTIAL OF WINERY BY-PRODUCTS

Rui Dias Costa[a],*, Raúl Domínguez-Perles[b], Irene Gouvinhas[a], and Ana Novo Barros[a],*

[a]Centre for the Research and Technology of Agro-Environmental and Biological Sciences (CITAB)/Institute for Innovation, Capacity Building and Sustainability of Agri-Food Production (Inov4Agro), University of Trás-os-Montes and Alto Douro, Quinta de Prados, 5000-801 Vila Real, Portugal.
[b]Phytochemistry and Healthy Foods Lab (LabFAS), CEBAS-CSIC (Consejo Superior de Investigaciones Científicas), Campus Universitario de Espinardo, Edif. 25, 30100 Murcia, Spain.
*Corresponding authors:
ORCID iD: 0000-0003-4681-9276; 1991; ruiacosta@utad.pt; +351964477255 ORCID iD: 0000-0001-5834-6141; abarros@utad.pt

Wine production generates substantial quantities of winery by-products (WBP) as residues stemming from the winemaking process. These by-products encompass a wide range of materials, including wastewater sludge, stems, pomace (comprising skins, pulp, and seeds), wine lees, grapevine shoots, and various other residues [1–5]. Numerous previous studies have underscored the rich potential of these residues as abundant sources of natural antioxidants, primarily owing to their high content of bioactive phytochemicals, particularly phenolic compounds [1]. These phenolic compounds extracted from WBP have been associated with a diverse array of significant biological effects, including antioxidative, anti-aging, cardioprotective, antibacterial, anti-inflammatory, and anticancer properties [6]. Recent research has shed light on the growing importance of tyrosinase and elastase inhibitors in the fields of cosmetics and pharmaceuticals.

The objective of this study was to explore the potential applications of stems, pomace, seeds, wine lees, and grapevine shoots from the Região Demarcada do Douro in the cosmetic industry. To achieve this objective, we conducted spectrophotometric assays to determine the phenolic content, antioxidant capacity, and activities related to skin aging enzymes (anti-elastase and anti-tyrosinase). To extract (poly)phenolic compounds from the WBP, we employed a solid-liquid conventional extraction method using a mixture of ethanol and water (50:50, v/v). Furthermore, we carried out a tentative identification of (poly)phenols present in stems using High-Performance Liquid Chromatography with Diode Array Detection (HPLC-DAD).

The results of our analysis revealed that all WBP exhibited promising properties in terms of anti-elastase activity. Based on the findings of this study, it is evident that the stems and one seed sample exhibit potential for utilization in the cosmetic industry due to their superior values compared to the other WBP investigated.

Keywords: winery by-products, (poly)phenols, antioxidant capacity, anti-aging activity

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→ ABSTRACT COMPETITION WINNERS

1st prize

ANA A. VILAS-BOAS

UNIVERSIDADE CATÓLICA PORTUGUESA, CBQF - CENTRO DE BIOTECNOLOGIA E QUÍMICA FINA – LABORATÓRIO ASSOCIADO

I want to express my gratitude to the Smart Waste Young Professionals for organizing an exceptionally well-executed and impactful event. It was an honor to present my PhD Project results and disseminate them to a wider audience.

As a young researcher, attending this conference was an amazing opportunity and a truly enriching experience that brought together brilliant young minds and industry experts in the circular economy field, fostering an intellectually stimulating and collaborative environment. The abstract competition was an exciting addition to the conference, challenging attendees to think creatively and improve their pitch for showcasing the potential of circular economy solutions. I am incredibly honored to have won first prize in the abstract competition. This challenge pushed me to condense my last three years of research into an impactful pitch, improving my professional and personal skills. Overall, this event has enriched my professional journey and motivated me to continue pushing the boundaries of the circular economy, especially for the development of upcycled ingredients.

2nd prize

CARINA COIMBRA

UNIVERSITY OF COIMBRA, CENTRE FOR MECHANICAL ENGINEERING, MATERIALS AND PROCESSES, DEPARTMENT OF LIFE SCIENCES

I highly recommend the online conference "CIRCULAR ECONOMY: MAKE IT HAPPEN". The conference brought together a broad range of young professionals and industry partners. It was an honor to be part of such a renowned conference, where each of us could share our new ideas and contributions to implement a sustainable solution with new circular economy models. Without a doubt, the conference was the most fruitful conference I have had the pleasure of attending.

3rd prize

ANARETH CAVUQUILA

CICECO - AVEIRO INSTITUTE OF MATERIALS, DEPARTMENT OF CHEMISTRY, UNIVERSITY OF AVEIRO

I would like to express my gratitude for the honor of being awarded the 3rd place in the abstract competition.

Participating in this conference has been an incredible opportunity. It provided a valuable platform to engage with fellow researchers and connect with experts in the field of waste circular economy. The abstract competition challenged me to condense my research into a concise and impactful format, improving both my academic and presentation skills. This experience has not only enriched my academic journey but has also given me the motivation to continue pushing the boundaries of knowledge in my PhD work.

The first and second prizes received a sponsorship for participation in training or education initiatives, worthing €250 and €100, respectively. The third prize received an educational voucher (FNAC bookstore) worthing €50. The awards will give young researchers excellent opportunities to increase their knowledge and expand their professional networks worldwide.

SPONSORS

LIPOR - Intermunicipal Waste Management Service of Greater Porto

LIPOR was founded in 1982 as Municipality Association and manages, recovers, and treats the municipal waste produced in eight municipalities of the Greater Porto Area: Espinho, Gondomar, Maia, Matosinhos, Porto, Póvoa de Varzim, Valongo, and Vila do Conde. At the same time, LIPOR continues to share good practices with the population, which are supported by awareness campaigns.

Every year, LIPOR treats around 500,000 tons of municipal waste which is produced by about 1 million inhabitants.

LIPOR is driven by modern waste management practices that promote the adoption of integrated systems, the minimization of waste disposal in landfill, and the implementation of Circular Economy principles. In its activity, LIPOR applies the three pillars of Sustainable Development: environmental, economic, and social.

More information available here: https://www.lipor.pt/en/

Municipality of Mafra

Certified as a "Biosphere Destination", the Municipality of Mafra stands out for its singularities. Preserving nature, promoting the well-being of all and ensuring socioeconomic sustainability are municipal priorities. The Municipality has promoted transversal projects, highlighting: the promotion of gentle forms of mobility, namely by encouraging the use of public transport; the renovation and replacement of public lighting, etc.

More information available here: https://www.cm-mafra.pt/

ABOUT SMART WASTE PORTUGAL YOUNG PROFESSIONALS

→ SMART WASTE YOUNG PROFESSIONALS

Smart Waste Young Professionals (SWYP) were established by Smart Waste Portugal in March 2020 as a forum for young professionals up to 35 years old, who have professional activity and interest in topics related to the circular economy.

SWYP's vision is "An economy without waste" and its mission is "To create networks and share knowledge among young professionals who see waste as important economic and social resources". SWYP activities are grouped into four main programs:

- → Mentoring & Career Development.
- → Communication & Marketing.
- → Research & Innovation.
- → Education Program.

→ HOW TO JOIN SWYP

Are you 35 years or younger? Are you a professional, student or interested in Circular Economy and the Waste Management value chain? Are you motivated to collaborate and make the world a better place? If you have answered yes to these questions, we would be thrilled to welcome you to the group!

For more information on how to sign up for the group, visit our website.

We hope you can join us! Please feel free to reach out if you have any questions.

→ SMART WASTE PORTUGAL

Smart Waste Portugal - Business Development Network (SWP) is a non-profit private Association created in 2015 as a national platform to promote and value the use of waste as a resource. SWP acts across the value chain, promoting research, development, and innovation and fostering cooperation between public and private, national, and international entities. With over 150 member entities from different sectors (waste management, industry, academia, and associations), SWP intends to foster the application of circular economy principles to boost the competitiveness of Portugal.

→ CONTACT US

Do you want to:

- Receive invitations for upcoming events?
- Keep up to date on our initiatives?
- Read stories and information about the industry?
- Learn more about our members through our "YP of The Month" initiative?

So you can:

→ Follow us to stay up to date on all our activities

www.linkedin.com/company/smart-waste-portugal-young-professionals/

www.instagram.com/smartwasteyp/

→ E-mail us:

young.professionals@smartwasteportugal.com

To know more about us:

→ Check our website:

https://smartwasteportugal.com/young-professionals

SWYP
Smart Waste
Young Professionals