Book of Abstracts

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Scholarship Researchers' Day

17 November 2023 ▪ UTAD ▪ Vila Real ▪ Portugal

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Inov4Agro Scholarship Researchers' Day
17th November 2023

University of Trás-os-Montes and Alto Douro
Quinta de Prados
5000-801 Vila Real
Portugal

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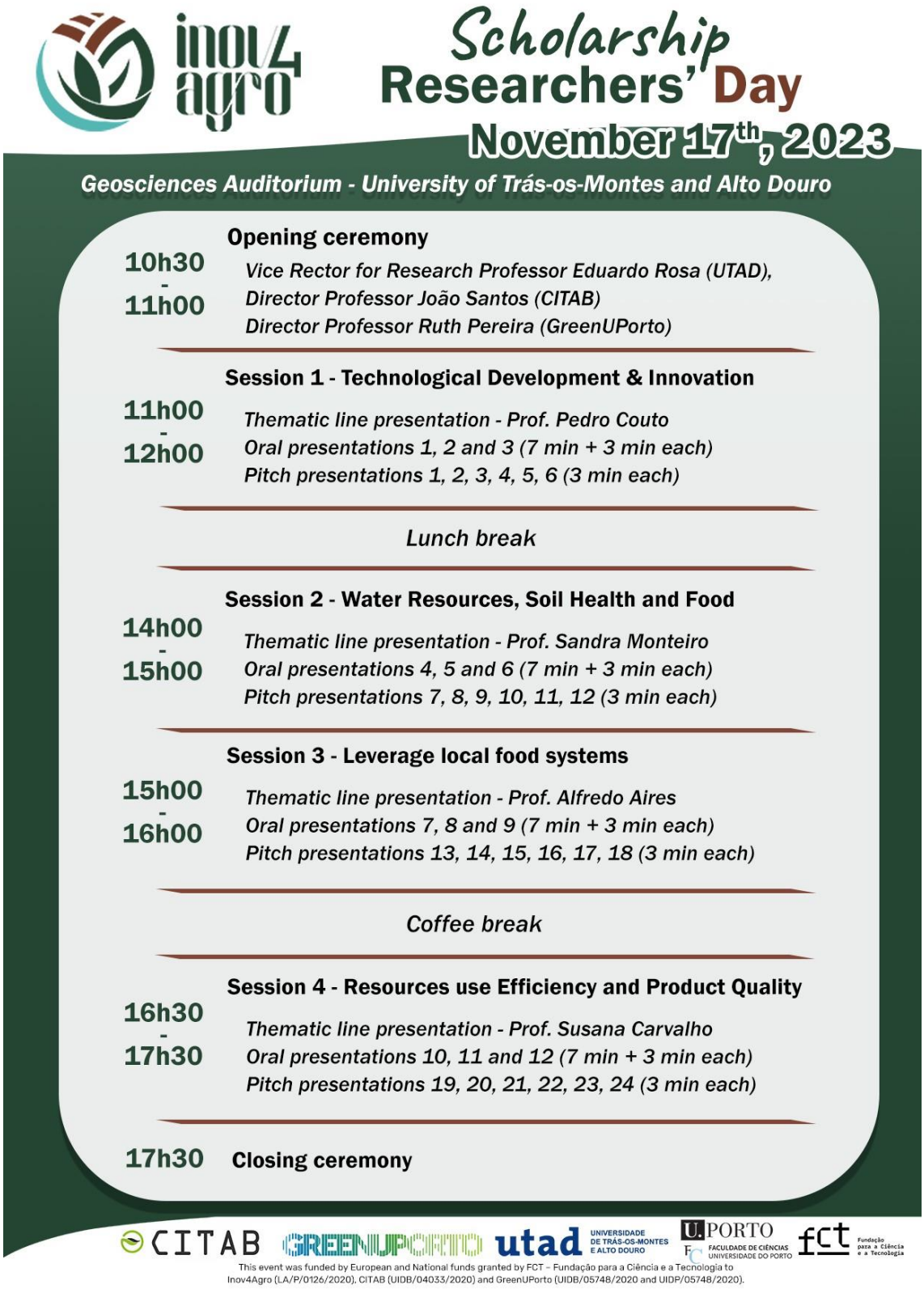

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ORAL COMMUNICATIONS

OC1 - ALMOND CULTIVAR IDENTIFICATION USING MACHINE LEARNING CLASSIFIERS APPLIED TO UAV-BASED MULTISPECTRAL DATA

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In Portugal, almonds are a very important crop due to their nutritional properties. In the northeast of the country, almond cultivation has persisted for a long time, with strong cultural traditions and great economic importance. Several varieties are grown in these areas. The presence of different almond varieties requires differentiated management in irrigation, disease control, pruning system, and harvest scheduling. Therefore, classification of cultivars is essential in large agricultural areas. In recent decades, remote sensing data have led to important breakthroughs in the classification of different cultivars for various crops. However, for almonds, studies are still in their infancy. Therefore, the aim of this study is to fill this knowledge gap and investigate the classification of almond cultivars in an almond orchard. High-resolution multispectral data were acquired from an unmanned aerial vehicle (UAV). Vegetation indices (VIs) and tree structure parameters were then estimated. To obtain accurate cultivar identification, four machine classifiers, such as K-nearest neighbor (kNN), support vector machine (SVM), random forest (RF), and extreme gradient boosting (XGBoost) were applied and optimized through a fine-tuning process. The accuracy of the machine learning classifiers was analyzed. SVM and RF performed best with OAs of 76% and 74% using VIs and spectral bands (GREEN, GRVI, GN, REN, ClRE).
The addition of the tree canopy height model (CHM) improved performance, whereas RF and XGBoost had OAs of 88% and 84%, respectively. kNN performed worst with an OA of 73% when only VIs and spectral bands were used, 80% with VIs, spectral bands, and CHM, and 93% with VIs, CHM, and tree canopy area (TCA). The best performance was obtained from RF and XGBoost with OAs of 99% with VIs, CHM and TCA. These results show the importance of the feature selection process. Furthermore, this study demonstrates the feasibility of remote sensing data and machine learning classifiers in classifying almond varieties.

OC2 - HERBICIDAL AND ANTIBACTERIAL ACTIVITIES OF LIPID NANOPARTICLES ENCAPSULATING AN EUCALYPTUS AQUEOUS EXTRACT

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Weeds and phytopathogens have been identified as two of the most impacting biotic stress factors impairing agri-food production. However, weed management mainly depends on synthetic herbicides, negatively affecting the environment, and effective methods for bacterial disease management are limited. Hence, eco-friendly solutions to tackle this issue are needed. Thus, the production of aqueous extracts from *Eucalyptus globulus* leaves, which have recognized allelopathic and antibacterial features, may represent a sustainable way of harnessing their phytochemicals for biopesticide development. Yet, due to their hydrophilicity, the limited movement through cell membranes may compromise their efficacy. So, this study aimed to nanoencapsulate an aqueous extract prepared with dried leaves (DLE) of young *E. globulus* into lipid nanoparticles (LN) and evaluate their herbicidal and antibacterial activities. The herbicidal activity of LN containing DLE encapsulated (LN-DLE) was evaluated by foliar-spraying two-weeks-old *Portulaca oleracea* seedlings with LN-DLE at 50 and 100% (v/v). As control situations, deionized water, the corresponding concentrations of DLE encapsulated in the LN and the unloaded LN (LN-empty) were considered. After 4 weeks, results revealed that LN-DLE and LN-empty had similar effects on weed viability. Parallelly, the antibacterial activity of LN-DLE was assessed, by monitoring the growth of *Xanthomonas euvesicatoria (Xeu), Pseudomonas syringae* pv. *tomato (Pst),* and *Clavibacter michiganensis michiganensis (Cmm)* for 48 h. Results showed that while the growth of *Pst* and *Xeu* was stimulated by LN-empty, LN-DLE strongly impaired the growth of all species. Overall, results showed that LN-DLE has promising antibacterial activities. Next, LN-DLE biopesticide activities will be optimised in soil-based assays.

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OC3 - ENHANCING URBAN RESILIENCE THROUGH NATURE-BASED SOLUTIONS: CAN NBS BE UPSCALED TO ADDRESS SOCIETAL CHALLENGES?

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Cities worldwide deal with complex challenges from population growth, lack of soil management, and financial constraints, further intensified by global issues like climate change, water security, air pollution, etc. To address these problems, innovative solutions transcending traditional boundaries are crucial. The European Union has emerged as a key supporter of NbS in urban settings, harmonizing ecosystem-based strategies with social and economic dimensions through initiatives like the 2030 Agenda and the EU Green Deal.
Implementing NbS in green urban areas will enhance ecosystem resilience and mitigate urban pressures such as heatwaves, floods, air, soil, and water pollution while addressing broader societal challenges like climate change. Adopting a landscape-oriented approach is crucial in ecosystem restoration and upscale NbS strategies, merging climate action, disaster risk reduction, and biodiversity conservation within a unified framework.
An NbS project was implemented in the Cavalum Valley at Penafiel, Portugal. The IUCN Global Standard for NbS self-assessment tool was used to monitor and access it. Results show the potential of NbS implementation in this urban green area to increase biodiversity and ecosystem services, contributing to the Sustainable Development Goals.
These insights offer valuable lessons to upscale it to a landscape scale in Foz Côa Valley. NbS integration in urban and rural planning is a critical tool for enhancing resilience, tackling environmental challenges, and promoting a greener, healthier living environment. IUCN Global Standard for NbS is a valuable tool to assess, implement, and monitor NbS projects in the field, fostering transparency and efficient collaboration among policymakers, managers, and stakeholders.

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OC4 - SUSCEPTIBILITY OF IBERIAN PENINSULA TO EXTREME PRECIPITATION AND ARIDITY: A NEW HIGH-RESOLUTION ANALYSIS OVER A 1950–2022 HISTORICAL PERIOD

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The susceptibility to precipitation extreme events (PEE) and aridity in the Iberian Peninsula (IP) were assessed over a long historical period of 1950–2022 and a shorter period of 1981–2022, through the calculation of three extreme precipitation and two aridity indices. Moreover, two extreme precipitation susceptibility indices were also applied (a composite index and a principal component-based index). ERA5-Land reanalysis data were used for this purpose, bias-corrected with the Iberia01 observational dataset as a baseline in their overlapping period (1971–2015), following a quantile-mapping approach. A trend analysis carried out for the two periods reveals an annual and seasonal drying over southwestern, central, and northeastern regions, accompanied by a wetting over the southeast in annual terms. The PEE contribution to total precipitation, higher over eastern IP, is increasing in several coastal regions during winter, and in north-central regions during summer and annually. High to very high susceptibility areas, which amount to circa 50% of the IP, are located on the mountains' Atlantic/Mediterranean-facing side, whereas the inner plateaus reveal low to moderate susceptibility. Our results agree with previous studies, hinting at the most susceptible regions of the IP to PEE and the recent past trends, which may contribute to improving e.g. the assessment and mitigation of flood risks, or to reduce the impact of water scarcity in the agro-food industry, as well as the destruction of crops during extreme precipitation events.

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OC5 - RECYCLING ORGANIC SUBSTRATES TO IMPROVE SOIL HEALTH AND FERTILITY: AN ECOTOXICOLOGICAL ASSESSMENT

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In recent years, soilless production systems have been increasing the use of organic substrates (OS) as growing media due to its benefits regarding crops yield and efficient use of resources. Simultaneously, the agricultural sector is being pressured to reduce the use of non-renewable resources, particularly peat. Herein, other organic materials have been gaining market such as coir, pine bark, wood fibre. Nonetheless, large amounts of these residues are generated, and the disposal solutions vary from incineration, landfills to soil incorporation. The latter is a desirable solution, closing the cycle of these organic products, with potential to improve soil health and fertility, contributing to soil carbon sequestration. However, the risk of contamination of these substrates during the cultivation cycle cannot be neglected (e.g., residues of plant protection products (PPPs) and fertilisers). This work aimed to assess the ecotoxicological effects of soil amended with three widespread OS constituted of coir (two) or a mix of coir with pine bark (one) obtained from different commercial greenhouses. All amendments were tested independently using an agricultural soil and incorporated at the rates of 2.5, 5.0 and 10.0%. A set of chemical and physical analyses and a battery of standardised toxicological assays using different trophic level organisms (terrestrial/aquatic) were performed. Enzymatic activities and important soil processes were measured. The results show that soil amendment with OS residues is a promising practice regarding the improvement of soil quality and microbial metabolic activity, yet some caution must be taken regarding the degree of chemical contamination of these residues.

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OC6 - FROM THE PAST TO THE FUTURE - THE ROLE OF ALGAL WRACK AS AN ECO-FRIENDLY SOIL AMENDMENT

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The overuse of chemical fertilisers to meet the worldwide food demand led to the degradation of soil organic matter (OM) and loss of fertility and productivity, forcing the need to develop sustainable and efficient alternatives. Therefore, this work aimed at assessing the potential of wrack, an organic residue from marine origin that was an important OM source for agriculture in the coastal areas in the past, to increase soil quality and functions. Thus, three increasing concentrations of this residue [0.5%; 1%; 2% (m/m)] were added to an agricultural soil. A control, without wrack, was also prepared. After 15 and 30 days of stabilization, several physical and chemical parameters, microbial indicators and ecotoxicological tests using the soil invertebrates *Eisenia fetida* and *Folsomia candida* were conducted. The results evidenced a positive effect of wrack addition on soil pH, electrical conductivity, and OM, mostly after 15 days of stabilization. However, the biochemical parameters remained almost unchanged regardless of wrack application and time of stabilization. Finally, the reproduction rate of *F. candida* was overall stimulated upon wrack application, while the number of juveniles of *E. fetida* was higher after 30 days of stabilization. The beneficial effects of wrack were also verified in a copper (Cu) contamination scenario, where after a month of incubation, the reproduction rate of these organisms raised to control levels upon co-application with 1% (m/m) wrack. Overall, data suggest an improvement in soil quality after the wrack application, with proven benefits for the reproduction of soil organisms even in toxic environments.

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OC7 - FLAVONOIDS STRUCTURAL MODIFICATION: INFLUENCE IN CELL TOXICITY AND PHOTOPROTECTIVE CAPACITY

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Aging is a natural process that affects cell and tissue functions and increases disease susceptibility. Internal and external factors, such as cellular processes and exposure to external stressors (e.g., UV radiation (UVR), pollution, and smoking), contribute to this phenomenon. Flavonoids, derived from plant secondary metabolism, offer benefits to human health due to their intrinsic properties. Flavonols such as kaempferol, quercetin, and myricetin exhibit structural variations, which may lead to differences in their bioactivities. This study aimed to examine how structural differences affect the photoprotective capacity and safety/toxicity profile of these flavonols, using in vitro and cell-based methods.
Cellular safety/toxicity was assessed using HaCaT cells (human immortalized keratinocytes) exposed to different periods and concentrations of the three flavonols (kaempferol, quercetin and myricetin), using the Alamar Blue metabolic indicator. Photoprotective capacity was evaluated using the sun protection factor (SPF) method to identify the most effective photoprotector at non-cytotoxic concentrations.
Kaempferol and quercetin significantly affected HaCaT cells' viability after 24 and 48 hours, while myricetin's impact was evident after 48 hours. Variations in cellular bioactivity were observed between the compounds at equivalent concentrations. Regarding SPF assessment, each flavonol exhibited distinct photoprotective capacities but showed high UVR absorption potential, indicating strong photoprotection potential.
In conclusion, structural differences in flavonols influence their safety/toxicity profiles and UVR absorption capacities, resulting in different bioactivities. Exposure duration and dosage are factors that contribute to their bioactivity. These flavonoids have high photoprotective potential.

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OC8 - EXTRACTION OF HIGH-VALUE PRODUCTS FROM EDIBLE INSECT *Tenebrio Molitor*

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Sustainable novel foods incorporating edible insects are becoming popular. The goals of this work were to develop protein extraction techniques for *Tenebrio molitor* larvae that produce high-purity protein concentrates with favourable techno-functional properties, while also allowing for a complete fractionation.
The study developed two methods: isoelectric point precipitation (IP) and membrane ultrafiltration with a 50 kDa cut-off, while chitin was also extracted from the insoluble fraction resulting from the initial alkaline solubilization. The protein fractions were evaluated for extraction efficiency (protein content, yield, and recovery rate), protein profile (size exclusion chromatography), and techno-functional properties (colour, foaming, and emulsifying properties, and water/oil absorption capacities).
The IP and the > 50 kDa fraction had protein contents above 80%, while the <50 kDa fraction only had a protein content of 44.2%. Despite their high protein content, the IP and >50 kDa only attained a protein recovery rate of 26.8% and 27.9%, respectively. The >50 kDa fraction had better colour properties than the IP fraction, the defatted fraction, or powder samples. Additionally, the protein fractions presented better techno-functional properties than the powder or defatted sample, while the >50 kDa fraction even had better properties than commercial protein concentrates (whey or pea protein).
The protein extraction based on ultrafiltration, leading to a protein concentrate with high purity and acceptable techno-functional properties -which can function as an alternative to the more common method based on isoelectric point precipitation- has undergone patenting [1]. Furthermore, this fractionation method also allows for the extraction of insects' fat and chitin.

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[1] Ribeiro, J.C., Cunha, L. M., & Pintado, M. E. (2022). *Method for fractioning of an edible insect* (NPAT487/2022), filing the provisional patent application, INPI

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OC9 - PERCEPTIONS OF PORTUGUESE CONSUMERS TOWARDS LOCAL AND SEASONAL FOODS

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The consumption of seasonal and locally produced foods, to reduce long-distance imports and the environmental footprint from consumer food choices, remains relatively little discussed and investigated. Previous research [1] has shown that these concepts are not clear in the literature. This work investigates consumers' attitudes, perceptions, and beliefs about seasonal and local food. was used to create and implement a questionnaire. A questionnaire divided into different sections, evaluating the general perspectives towards both concepts and their characteristics, was implemented in the Lime Survey platform. A convenience sample of 414 Portuguese participants was recruited in the Metropolitan Areas of Porto and Lisbon. The concept of a 'product available in specific periods of the year', was the most strongly associated with seasonality (80 % of the participants). Aligned with the previous literature review, the concept of “products purchased directly from the local producer”, was significantly more associated with local food, rather than some measure of the distance between the place of production and consumption. Over 80% of the participants considered seasonal and local products tastier, and more than 70% assumed them as more environmentally friendly. More than 70% of the respondents replied that being local and seasonal were important characteristics of their everyday foods. About 75% of respondents reported striving to buy seasonal products, with only 62% with difficulties purchasing local foods. Such information can be used to develop communication campaigns and interventions that will help to improve the development of seasonal food systems that are local.

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[1] Vargas, A. M., de Moura, A. P., Deliza, R., & Cunha, L. M. (2021). The role of local seasonal foods in enhancing sustainable food consumption: A systematic literature review. Foods, 10(9), 2206.

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OC10 - PROTECTING TOMATO PLANTS IN THE FIGHT AGAINST CLIMATE CHANGE – THE ROLE OF BIOCHAR AND MYCORRHIZAL FUNGI

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Tomato production in the Mediterranean is severely challenged by the current scenario of climatic instability, with this region being highly affected by intense and prolonged heat waves, as well as by soil salinization. Therefore, and following our previous studies on the effects of combined heat and salt stress on tomato plants, the present work intends to unravel the potential benefits of arbuscular mycorrhizal fungi (AMF) and biochar in alleviating the impacts of these stress conditions. The data obtained showed that, after 21 days of stress exposure, plants grown in a substrate amended with AMF and biochar presented a boosted resilience to salt (irrigation with 100 mM NaCl), heat (daily exposure to 42 °C for 4 hours) and combined stress, exhibiting higher biomass and flowering rate. Through a more thorough analysis, this work reveals that the enhanced tolerance observed is closely related to an improved photosynthetic efficiency (*i.e.,* increased carbon assimilation and chlorophyll content) and a more balanced nutrient profile, accumulating significantly less sodium than their counterparts under saline conditions. Moreover, the presence of biochar and AMF in the substrate resulted in elevated proline content and an organ-specific modulation of glutathione and ascorbate levels, as well as an overall decrease in the need for enzymatic antioxidant pathways. In summary, these results highlight the role of biochar and AMF strategies as sustainable tools with vast potential to help plants thrive, even through these unprecedented climatic challenges.

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OC11 - ISOLATION AND CHARACTERIZATION OF ADIPOSE-DERIVED MESENCHYMAL STROMAL CELLS – A POTENTIAL TREATMENT FOR CANINE INFLAMMATORY BOWEL DISEASE

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Conventional therapy for immune-mediated diseases is associated with long-term adverse effects, requiring the quest for novel therapeutic options. Through the secretion of various trophic factors, mesenchymal stromal cells (MSC) demonstrate immunomodulatory properties that make them a potential approach for treating autoimmune diseases, namely canine inflammatory bowel disease (IBD). Challenges associated with the use of MSC include inconsistency in donor selection, tissue sources and manufacturing procedures.
The main goal of this work was to isolate, characterize and optimize the *ex vivo* expansion of MSC derived from canine adipose tissue (AT), with the goal of developing a viable therapeutic approach for canine IBD. Subcutaneous AT was collected from 5 female dogs during ovariohysterectomies and digested with collagenase. Cells were isolated and expanded with Dulbecco's modified Eagle's medium supplemented with 10% MSC-qualified fetal bovine serum (FBS-MSC) or 10% standard FBS (FBS). Cell growth and immunophenotype were assessed.
Isolated cells exhibited typical MSC morphology and high viability (>95%) up to passage 4 (P4). At P2, after 7 days in culture, cells reached average densities of $1.5x10^5$ cells/cm^2 and $1.3x10^5$ cells/cm^2, corresponding to cumulative population doublings of 9.6 and 9.0 for FBS-MSC and FBS, respectively. Flow cytometry analysis revealed high expression of CD90, CD44 and CD105 characteristic of an MSC-phenotype.
Overall, canine AT is an easily obtainable source of MSC. Isolated cells demonstrated enhanced growth in culture medium supplemented with FBS-MSC. P2 allowed a reasonable compromise of culture time *vs*. cell yield towards potential clinical use. Ongoing work includes optimization of MSC differentiation protocols.

OC12 - IMPACT OF "TINTA BARROCA" GRAPE STEM EXPOSURE ON OXIDATIVE STRESS PARAMETERS OF *EISENIA FETIDA*

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Grape stems, often challenging to dispose of as winemaking by-products, contain valuable phenolic compounds with applications in the cosmetic, pharmaceutical, and food industries. This study evaluated their impact on oxidative stress parameters using *Eisenia fetida*, a toxicity and regenerative research model organism.
Four experimental conditions were established: control group (E0) using OECD artificial soil (70% sand, 20% clay and 10% peat) and three exposure conditions where ground grape stems replaced 5% (E5), 10% (E10) and 25% (E25) of the peat. Each condition included ten adult earthworms subjected to posterior-end amputation. Samples were collected at 30 (T1) and 45 (T2) days post-amputation from regenerated segments (n=3) and adjacent segments (n=3) to evaluate superoxide dismutase (SOD), catalase (CAT), glutathione S-transferase (GST), and peroxidase (POD) activities. Statistical analysis was performed using a three-way ANOVA with the Bonferroni post-hoc test.
The main changes in enzyme activity were found in the adjacent segments, especially at T2. The regenerated tissue showed consistently lower activities of all the enzymes except for CAT, which showed similar values. All treatments led to an increase in GST activity in the adjacent tissue at both times. Regarding SOD, the E10 treatment at T2 promoted the maximum SOD activity observed in both tissues.
Considering that enzyme activity before and after the amputation procedure in E0 was not altered, we can infer that grape stems are responsible for the changes observed. In general, these treatments promote the activity of antioxidant enzymes.

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PITCH PRESENTATIONS

PP1 - ESTIMATION OF RECENT-PAST AND FUTURE THERMAL CONDITIONS FOR *Prunus dulcis* IN NORTH-EASTERN PORTUGAL

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Almond trees have historically been grown in the Trás-os-Montes agrarian region (TM) (north-eastern Portuguese). However, the growing circumstances could be dramatically altered by climate change. Here, chill and heat conditions in TM are evaluated along with various varietal phenological timings. The chilling phase is evaluated using the Dynamic Model (CP) model. The Growing Degree Hours (GDH) model is chosen for the forcing phase. The models are constructed using daily temperatures for the baseline period (Iberia01, 1971–2015) and two future periods (EURO–CORDEX: 2041–2060 and 2061–2080). The future is simulated following two anthropogenic forcing scenarios (RCP4.5 and RCP8.5). While estimates for GDH show an increase in heat conditions until the start of summer, projections for CP show a decline, mostly for RCP8.5. According to GDH, high temperatures could be harmful instead causing stressed almond trees to accumulate less heat. Late cultivars may have a larger decline in CP and GDH, compared with early cultivars. However, a rise in heat accumulation should be more harmful than a fall in cooling temperatures. Currently, almond tree monitoring with climate variation is mandatory, and adaptation measures may in the future mitigate losses in yield/quality of almond orchards.

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PP2 - ENVIRONMENTAL SAFETY EVALUATION OF CHITOSAN NANOPARTICLES LOADED WITH ESSENTIAL OILS AS NEW BIOPESTICIDES

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Essential oils (EOs) are fragrant, hydrophobic natural products and a rich source of bioactive substances including volatile terpenoids and phenolic compounds, derived from aromatic and medicinal plants. Despite having a natural character, they can be toxic and environmentally sensitive. As a result, nanoencapsulation appears as a solution to these potential drawbacks. The natural polymer chitosan, well known for its antimicrobial activity, is a suitable agrochemical nanocarrier and it has been used in several studies. Due to the high loading and transport capacity of chitosan nanoparticles for lipophilic EOs and other volatile bioactive chemicals, ionic gelation was used in this study to create nanoformulations based on electrostatic contact between the cationic chitosan and the anionic TPP (tripolyphosphate). The EOs used were *Satureja montana*, *Thymus vulgaris*, *Anethum graveolens,* and *Coriandrum sativum*. Despite some formulations have been developed with these EOs there is limited research on their ecotoxicological profile. Therefore, aquatic, and terrestrial non-target model organisms were used to assess the environmental safety of these formulations and, they proved that nanoformulations protect oils from the external environment while reducing their toxicity.

PP3 - ANALYSIS OF SEVERE SUB-HOURLY PRECIPITATION EVENTS IN MAINLAND PORTUGAL: DYNAMICAL AND THERMODYNAMICAL DRIVERS

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Sub-hourly heavy precipitation events (SHHPs) related to regional low-pressure (RegL) systems pose a significant natural hazard, causing losses in various sectors, including agriculture. The present study aims to analyse the dynamic and thermodynamic drivers of these events in mainland Portugal. Observations from three operational automated weather stations were used to identify precipitation episodes between 2000 — 2022, being classified into four classes, according to the precipitation recorded in 10 minutes. The analysis of the driver's dynamics and thermodynamics reveals consistent patterns between the different regions, systems exhibit a cold core, particularly strong at mid-levels, and a positive vorticity anomaly, stronger in the upper troposphere extending downward to low levels, suggesting that these events are associated with cut-off lows. The differential positive vorticity advection caused by these systems causes a rising movement to the east of the low-pressure systems. In low levels, these systems promote moisture advection over western Iberia, also generating instability conditions, which are assessed by instability indices (Convective available potential energy, the Total-Totals index, and the K-index). The total column cloud ice water revealed higher values for heavier precipitation events, suggesting that it may be a useful predictor of heavy precipitation events.

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PP4 - IMPORTANCE OF EXTRINSIC CHARACTERISTICS, PERCEIVED WELLBEING, AND CONSUMER ORIENTATION TOWARDS CONVENIENCE AND NATURALNESS IN THE WILLINGNESS TO TRY READY-TO-EAT RICE PRODUCTS WITH ENHANCED NUTRITIONAL PROFILES

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This study aimed to evaluate the importance of selected attributes on willingness to try (WTT) ready-to-eat rice (RTErice), as well as to understand the influence of perceived wellbeing and personality characteristics. Eight RTErice concepts resulting from a full factorial design, based on the combination of three attributes (variety, processing, claim) with two levels (Basmati vs. Carolino, brown vs. milled + bran, low-GI vs. source of fiber) were profiled. A total of 106 Portuguese consumers (40 ± 13 years old) were invited to rate their WTT for each concept. A questionnaire comprising the Wellbeing Scale, New Naturalness Scale, and Convenience food-related lifestyle was applied after the experimental task. Conjoint analysis was conducted using ordinary least squares regression, and part-worth utilities. Variety (42%) and processing (36%) were significantly more impactful than claims (22%). Based on the partial utility value, participants were more willing to try the RTErice made of brown (0.233) Basmati (0.123) rice, with low GI (0.002). Regarding the influence of consumers' personality on WTT, multiple linear regression resulted in a significant model [$F(6,841) = 16.93$; $p < 0.001$; $R2 = 0.108$], in which the orientation towards convenience food choice (b=0.322), convenience in meal preparation and cooking (b=-0.122), naturalness importance (b=0.121), physical wellbeing (b=-0.386), and emotional wellbeing (b=0.499) were predictors of WTT RTErice products. It was concluded that consumers focused on convenience, naturalness, and wellbeing can be the main niche for RTErice products with enhanced nutritional profiles, and that the variety and processing of rice must be considered for its development.

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PP5 - ASSESSING THE *IN VIVO* EFFECTS OF *PTERIDIUM AQUILINUM* EXTRACT IN K14-HPV16 TRANSGENIC MICE

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Pteridium aquilinum, commonly known as bracken fern, is a versatile plant species that thrive in diverse environmental conditions and has a global distribution. However, it possesses toxic properties that can lead to various diseases in animals. The consumption of bracken fern has been associated with the development of gastrointestinal and bladder tumours, thiamine deficiency, retinal degeneration, and haemorrhagic diathesis. Ingestion of this plant by cattle can result in leukopenia (reduced white blood cell count) and thrombocytopenia (decreased platelet count). This study aimed to assess the haematological parameters of mice that were genetically modified to carry the human papillomavirus type 16 (HPV16) oncogenes and exposed to an extract of *Pteridium aquilinum* through their drinking water. This study received authorization from UTAD's Animal Welfare and Ethics Body (ORBEA) and Directorate General for Food and Veterinary (DGAV) (014139). We utilized 30 female mice and the *Pteridium aquilinum* extract was provided at concentrations of 0.0125g/ml, 0.025g/ml, and 0.05g/ml. The mice were divided into six groups (G1 to G6, n=5): G1 ($HPV16^{-/-}$, control), G2 ($HPV16^{-/-}$, 0.05g/ml), G3 ($HPV16^{+/-}$, control), G4 ($HPV16^{+/-}$, 0.0125g/ml), G5 ($HPV16^{+/-}$, 0.025g/ml) and G6 ($HPV16^{+/-}$, 0.05g/ml). Throughout the 28-day study, we recorded the mice's body mass, food intake, and water consumption. At the end of the study, we euthanized the animals and collected blood samples. Regarding weight gain, G2 was statistically superior ($p<0.05$) to G6, which received the highest concentration of extract (0.05g/ml). Overall, transgenic animals in groups G3, G4, G5, and G6 consumed more water and extract than their counterparts in other groups. The transgenic animals in G4, G5, and G6 consumed more food compared to other groups. The haematocrit was higher in groups that consumed the extract. Regarding haemoglobin, erythrocytes, leukocytes, lymphocytes, and platelets, the transgenic groups showed higher values compared to controls. The increase of the mentioned parameters may reflect the presence of HPV16 transgenes aggravated by the extract. However, more studies are being processed to better understand the relationship between the extract and HPV16.

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PP6 - IMPROVING WATER AND NITROGEN USE EFFICIENCY IN TOMATO THROUGH BIOTECHNOLOGICAL STRATEGIES

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Approximately 80% of the available freshwater is applied in irrigated agriculture, and the heavy use of N fertilizers has significant adverse effects on the environment and human health. Therefore, there is a critical need to improve the efficiency of water (WUE) and nitrogen (NUE) usage, especially in economically important crops. To make progress in this endeavour, plant breeding needs robust phenotyping data to complete functional genomics studies. The main goals of this Ph.D. project are: (i) to explore tomato genotypic variability in their tolerance to water, nitrogen, and combined water and nitrogen deficit, focusing on understanding the underlying factors behind WUE and NUE; (ii) to evaluate the potential of novel elicitors (e.g. omeprazole and strigolactones) towards more sustainable tomato production practices. In this presentation we will focus on the first aim. To that end, 13 tomato genotypes were grown in a high throughput phenotyping platform at the Leibniz Institute of Plant Genetics and Crop Plant Research under a gradual 30% W deficit and 50% N deficit for 21 days. During this experiment, daily data on various plant traits were collected using image-based techniques, including measurements of biomass, colour characteristics, and parameters related to photosynthetic health, all gathered through the use of RGB, fluorescence, and Fluorcam cameras. These results will enable the selection of tomato genotypes with contrasting responses to stress conditions for further investigation at a biochemical and molecular level. This, in turn, will aid in identifying key metabolites and genes associated with improved WUE and NUE.

PP7 - *EUCALYPTUS* LEAVES AS A BIOCIDE: A SUSTAINABLE APPROACH FOR WEED MANAGEMENT AND ENVIRONMENTAL ASSESSMENT –FIELD TRIAL RESULTS

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The need to maximize agricultural yields, driven by global food demand, has resulted in the excessive utilization of pesticides and chemical fertilizers since the 50s. However, in alignment with the Farm to Fork strategy targets, new eco-friendly approaches are required to reduce the use of synthetic plant protection products. Indeed, our research group has been developing a sustainable and environmentally conscious alternative by harnessing the allelopathic properties of *Eucalyptus globulus* Labill. Our results suggest that it can be used as an efficient weed management natural-based product. However, it is crucial to ensure that the incorporation of eucalyptus leaves into the soil does not have adverse effects on soil invertebrates and microbial communities. To address this question, a field experiment was carried out in which young eucalyptus leaves were incorporated into the surface soil (upper 10-20 cm) at a concentration of 5% (w/w). Bait-lamina assays were conducted to assess the feeding activity of soil-dwelling organisms in amended soils, and soil enzymatic activity was monitored as well. The results indicated that the incorporation of eucalyptus leaves did not adversely affect invertebrate feeding activity. Regarding soil microbial parameters, in general, changes in soil microbial activity was observed, especially at the end of the trial (128 days after application). The results of these and other endpoints measured (e.g. degradation of soil organic matter) are being integrated in order to assess if eucalyptus leaves could be a promising candidate for becoming a natural-based biocide.

PP8 - EVALUATING THE IMPACT OF A WESTERN DIET ON BIOCHEMICAL PARAMETERS IN AN ANIMAL MODEL OF BREAST CANCER

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Breast cancer continues to affect millions of individuals worldwide. In this way, it is of paramount importance to understand the effects of dietary choices in this disease development. This work aimed to evaluate the influence of Western diet (WD) on biochemical parameters in an animal model of breast cancer.
Twenty-eight female Wistar rats were divided into four groups (n=7): WD; WD+N-methyl-N-nitrosourea (MNU); Standard diet (SD); and SD+MNU. Animals from MNU groups received an intraperitoneal injection of the carcinogen MNU (50mg/Kg), at seven weeks of age. Animals were supplied with water and food *ad libitum*. WD groups received a WD with 60% of total calories coming from fat, while groups SD received a standard laboratory diet. Twelve hours before necropsy, animals were fasted and sacrificed through an intraperitoneal administration of ketamine (75mg/Kg) and xylazine (10mg/Kg). Blood samples were collected, and plasma was obtained by centrifugation (15min, 1500g). Biochemical parameters were determined in an autoanalyzer (Prestige 24i, Cormay). Data were analyzed using SPSS27, and values were considered statistically significant at $p<0.05$. Serum levels of albumin, glucose, and alanine aminotransferase (ALAT) were similar among groups ($p>0.05$). The highest cholesterol level was observed in SD group, (statistically different from WD and WD+MNU groups; $p<0.05$). Triglycerides levels were higher in SD groups (SD and SD+MNU) when compared with respective WD groups ($p<0.05$). Urea levels were higher in SD group when compared with WD group ($p<0.05$).
Our results suggested that WD promotes lower cholesterol and triglycerides levels, and consequently lower urea production.

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PP9 - IMPACTS OF COPPER IN VINEYARD SOILS: IS IT POSSIBLE TO REDUCE ITS ADVERSE EFFECTS?

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Copper-based fungicides are widely used in vineyards to protect this culture from downy mildew that causes great yield losses. The constant use of these products resulted on the accumulation of this element in the soil, with the potential of causing negative effects on non-target organisms. However, the degree of these adverse effects will depend on soil physical and chemical properties as Cu mobility/availability depends on them. Thus, the aim of this work was to assess which soil's physical and chemical properties are more relevant to the vulnerability of soils to copper toxicity and test different organic amendments to mitigate the impact of Cu contamination on the most vulnerable soil. For this, five vineyard soils from different wine regions were selected and contaminated in laboratory conditions with different Cu concentrations. An analysis of physical and chemical characteristics was performed and, after a month of incubation, a battery of ecotoxicological organisms with both aquatic and terrestrial species was performed with the amended soils. Results showed that the soil from Vinho Verde Region was the one more vulnerable to Cu contamination, which has the lowest pH. After this screening, a mixture of pine bark and mussel shell was added to this same soil contaminated with Cu to understand if this addition could decrease Cu toxicity to non-target organisms. By conducting ecotoxicological assays it was possible to see a decrease in the negative effects that Cu application had on these organisms due to the addition of these amendments to the soil.

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PP10 - ENVIRONMENTAL IMPACT ASSESSMENT OF FOOTWEAR RESIDUES TRANSFORMED INTO BIOCHAR USING COMMERCIAL TEST KITS

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Sustainable strategies are crucial to minimize environmental impacts that may be caused by footwear industry wastes, by optimizing materials life cycle and avoiding incineration and landfill disposal.
This work explores a sustainable approach to manage footwear waste by co-pyrolysis process with end-of-life agricultural substrates from soilless production systems. The obtained biochar was mixed with dried seaweed wreck and incorporated into a natural soil. The amended and the non-amended soil was incubated on a small-scale system, for 38 days and the leachate collected was used to assess the environmental safety for aquatic organisms. Standardized ecotoxicological bioassays using OCDE and ISO guidelines with *Daphnia magna*, *Lemna minor*, *Raphidocelis subcapitata* and *Allivibrio fischeri* (Microtox® bioassay) and a total of ten commercial kit assays (Algaltoxkit F, Duckweed toxkit F, Daphtoxkit F, Ceriodaphtoxkit F, Phytotoxkit for liquid samples, Thamnotoxkit F, Rapidtoxkit F thamno, Rotoxkit F, Rotoxkit F chronic and Protoxkit F) were performed.
In a general way eluates from soil amended with biochar footwear residuals showed no significant effects on aquatic organisms when compared to the control. However, some contradictory results cannot be neglected in what regards the safety of the biochar obtained from the footwear industry.
Despite some difficulties, as some test kit protocols are still complex and some tests performed differently, replacing standardized ecotoxicological test methods with test kits can be a viable option for routine waste evaluation by the footwear industry.

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PP11 - INCLUSION OF FOOTWEAR RESIDUES INTO THE SOIL: IMPLICATIONS FOR PLANT GROWTH AND OXIDATIVE STRESS

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The overall scope of this study aimed at assessing the environmental safety of several residues resulting from the footwear industry, envisioning the valorisation of such materials through their life-cycle, looking at their later inclusion into the environment. Following their usual course, these residues would be discarded, ending up in the environment, thus being relevant their ecotoxicological evaluation.

With the goal of avoiding the deposition of these materials in the landfill, the assessment of their toxicity as a combination with other industrial/environmental by-products was proposed, aiming at their further safe introduction into the environment. Therefore, together with end-of-life agricultural substrates, footwear industry residues were transformed into a *biochar*. Additionally, this *biochar* was used as a mixture with dry seaweed wreck, which was then incorporated into natural soil. Physical and chemical properties of the amended soil were evaluated, and growth assays with the eudicot *Brassica oleracea* were performed under a multi-species test. The assessment of oxidative stress biomarkers as well as the quantification of proline levels was also performed in plant samples.

Significant differences on soil properties were found for amended soils, but the inclusion of footwear residues alone only seemed to provide a higher input of organic matter into the soil, with soil properties appearing to be modulated by the amendment. Together with other environmental materials, the introduction of footwear residues into the soil does not appear to pose a significant threat to plant species growth and oxidative stress levels, at least based on the concentrations and conditions that were tested.

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PP12 - EVALUATING THE SAFETY OF THE INTEGRATION OF SHOE INDUSTRY RESIDUES IN SOIL THROUGH BIOCHAR

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The GreenShoes 4.0 Project aims to find an environmentally friendly disposable for waste materials from the footwear industry, specifically thermoplastic polyurethane and ethylene vinyl acetate, to replace landfills. The project evaluates the toxicity of these materials and other industrial by-products, converting footwear industry residues and end-of-life agricultural substrates into biochar. The biochar is then combined with dried seaweed debris and added to natural soil to form soil amendments.

To determine whether incorporating these materials into the soil would be environmentally safe, a variety of ecotoxicological tests were conducted in addition to an evaluation of the amended soil's physical and chemical properties. For 38 days, a multi-species assay was developed that included the amended soil, to which the soil invertebrate *Eisenia fetida*, was exposed and soil microbial parameters (dehydrogenase, urease, cellulase, acid phosphatase activities and potential nitrification) were measured and assessed several biochemical parameters including biomarkers related to detoxification, oxidative stress, energy reserves and neurotransmission. Additionally, aquatic organisms were exposed to soil leachates.

It was demonstrated that the introduction of shoe residues into the soil after pyrolysis, when combined with other environmental materials, is detrimental to aquatic organisms that encounter leachates from the amended soil. It was also possible to denote a change in soil enzymatic activity as well as in earthworms biomarkers.

The soil amendments had no appreciable detrimental effect on most organisms and endpoints, but the uncertainty brought on by the effects on aquatic organisms cannot be ignored and more testing should be conducted.

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PP13 - PORTUGUESE ENDEMIC *THYMUS* SPP. EXTRACTS AS A PROMISING NEW TOOL TO MANAGE NEURODEGENERATION, DIABETES AND TUMORAL GROWTH

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Thymus spp. are widely used in traditional medicine and pharmaceutical formulations for their bioactivities. Nevertheless, several thyme species are still understudied for their chemical composition and potential bioactivities. This is the case of *Thymus carnosus* Boiss. and *Thymus capitellatus* Hoffmanns & Link, two species listed as near-threatened and endemic to Portugal, whose phytochemical characterization was only recently reported [1,2,3]. In addition to rosmarinic acid and various flavonoid derivatives, their hydroethanolic extracts (HE) are rich in salvianolic acids and oleanolic and ursolic acids. Thus, by presenting a unique phytochemical profile, *T. carnosus* and *T. capitellatus* extracts should also be screened for health-promoting effects.
In this work, the anti-diabetic, neuroprotective, and anti-tumoral activities of *T. carnosus* and *T. capitellatus* HE extracts were evaluated. Anti-acetylcholinesterase and anti-tyrosinase activities were used to assess neuroprotection, anti-α-amylase and anti-α-glucosidase activities were used to evaluate anti-diabetic activity, and the anti-tumoral potential using the Alamar Blue assay, using a hepatocarcinoma cell line (HepG2).
T. carnosus and *T. capitellatus* HE extracts induced significant inhibition of acetylcholinesterase, and moderate inhibition of tyrosinase. Comparing both extracts, *T. capitellatus* extract produced the highest acetylcholinesterase inhibition (IC_{50}= 360 µg/mL). *T. carnosus* extract induced higher anti-tyrosinase activity than *T. capitellatus*. Concerning anti-diabetic activity, both extracts inhibited α-glucosidase activity, with the extracts of *T. capitellatus* presenting the highest inhibition (23%; 1 mg/mL). Nevertheless, *T. carnosus* extract produced higher anti-proliferative activity in HepG2 cells (IC_{50}= 103 µg/mL) revealing potential as an anti-tumoral agent.
In conclusion, these thyme species present potential to be considered functional foods, or sources of bioactive compounds with neuroprotective, anti-diabetic activity and anti-tumoral activity.

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PP14 - DEVELOPMENT OF AN EMOJI-BASED POLARITY SCALE FOR THE EVALUATION OF FOOD-EVOKED EMOTIONS

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Recently, emojis have been introduced in sensory and consumer sciences, revealing a huge potential to measure consumers' emotional associations with food products. The present work aimed to develop a set of emoji-based scales, following a semantic differential approach, using pairs of emojis of opposing polarity (valence), helping to better represent consumers' emotional response to food products.
Making use of the lists of emojis previously developed by Godoy, N. et al. (2021), two panels, of 100 children and adolescents (6 to 17 years old) and 100 adults (18-40 years old), were recruited and invited to freely pair antagonistic pairs of emoji pictures. Subsequently, each participant identified the emoji with a positive connotation, to better categorize their choice. Following, the pairs were compiled on a co-occurrence matrix and an Agglomerative Hierarchical Clustering (AHC) approach was used to validate co-occurring emojis. Since the goal was to achieve a polarity scale, Euclidean distance was also calculated, based on the valence and arousal values, as defined by Rodrigues et al. (2017) for the Portuguese population. The paring of the emojis followed a heuristic based on the AHC analysis, co-occurrence value and Euclidean distances.
After the AHC analysis, the analysed results focused exclusively on emoji pairs with co-occurrence count ≥ 10. The young consumers identified eight pairs, with a good polarity distance value, while adults proposed a list of ten pairs, based on the same criteria.
Both ballots were validated to be used in consumer studies to measure consumers' emotional responses in different food contexts.

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PP15 - EVALUATION OF THE SAFETY PROFILE OF CARVACROL AND THYMOL ON HaCaT AND SV80 CELL LINES

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Plants have been used in traditional medicine since ancient times, as they synthesize hundreds of chemical compounds, some of which possess relevant bioactivities [1]. Nowadays, there has been an increasing interest in the usage of natural products, and their phytochemicals, in food and pharmaceutical fields, especially in the development of novel drugs [2]. Carvacrol and thymol are two phytochemicals widely used commercially, with diverse applications, thus, it is important to study their safety profile aiming further applications.

This work aims to evaluate the cytotoxicity of carvacrol and thymol, in two different non-tumoral skin cell lines, HaCaT (keratinocytes) and SV80 (fibroblasts). Carvacrol and thymol was tested at concentrations up to 62.5 µg/mL. The cytotoxicity of both phytochemicals was performed through Alamar Blue assay [3]. Cells were exposed to the phytochemicals for 24 or 48 hours, and then to Alamar Blue.

In HaCaT cells, neither carvacrol nor thymol induced cytotoxicity at concentrations up to 62.5 µg/mL. However, in SV80 cells both terpenes produced a significant decrease in cell viability at the highest tested concentration (62.5 µg/mL). Cells exposed to carvacrol presented ~50% and 65% of cell viability at 24 h and 48 h, respectively, while cells exposed to thymol presented ~75% of viability at 24 h and 78% at 48 h.

In conclusion, carvacrol and thymol are safe to use in skin topical formulations when used up to 30 µg/mL.

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PP16 - ANTI-TUMORAL ACTIVITY OF CAFFEIC AND ROSMARINIC ACIDS IN BREAST CANCER CELL MODELS

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Lately, breast cancer has become one of the biggest health concerns worldwide, mainly affecting women [1]. Chemotherapy, one of the main therapeutic options for breast cancer treatment, presents several drawbacks, to mention, multidrug resistance resulting in reduced efficacy of chemotherapeutic drugs. Food-derived bioactive compounds, such a phenolics, commonly found in fruits, herbs and vegetables, present a wide array of health-promoting activities, among which the anti-tumoral activity is frequently addressed. Additionally, various compounds are being evaluated as potential co-adjuvants of chemotherapeutic drugs.

The aim of this work was to evaluate the anti-proliferative activity of caffeic (CA) and rosmarinic (RA) acids, in two human breast cancer cell lines (MCF-7: adenocarcinoma; BT-474: ductal carcinoma), as an initial screening for their potential as chemotherapeutic co-adjuvants. For that, Alamar Blue assay was used to evaluate the anti-proliferative activity and bright-field microscopy to perform cell morphology analysis [2].

Results showed that, at the highest tested concentration (200 μM), CA caused a significant decrease in MCF-7 and BT-474 cells viability (for 24 h and 48 h exposure), while RA only produced cytotoxicity towards BT-474 cells. Both phenolic acids significantly reduced MCF-7 and BT-474 cells viability, after 72 h exposure. Both cell lines presented morphological changes after being exposed, for 48 h and 72 h, to the phenolic acids.

In conclusion, both CA and RA induce anti-proliferative activity in two breast cancer cell models (MCF-7 and BT-474 cells), and thus present potential for future studies aiming to assess their potential as chemotherapy drugs' co-adjuvants.

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PP17 - GRAPE STEM-BASED NANOPARTICLES FOR TARGETED PROSTATE CANCER THERAPIES AND BY-PRODUCT UPGRADE

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Currently, there is an urgent need to recycle the millions of by-products generated in the winery industry to reduce environmental impact. Grape stems are an excellent by-product because they are a good source of polyphenols, which have high antioxidant/anticancer activity. The pursuit of polyphenols as a foundation for eco-conscious targeted therapies in addressing prostate cancer (PCa), a malignancy characterized by elevated rates of therapy resistance and recurrence, has experienced a notable upswing. Available treatments for PCa are limited and based on chemical drugs that cause severe side effects and patient resistance, increasing the interest in nanotechnology-delivery systems. The synthesis of gold nanoparticles (AuNPs), which have high specificity for PCa cells, releases large amounts of toxic compounds to the environment. Replacing conventional nanoparticle synthesis and chemical drugs used in PCa therapies with natural polyphenol-based AuNPs provides an environmentally friendly method to develop more efficient PCa therapies for reduce side effects. Therefore, we will use by-products from different wine varieties to explore the potential of polyphenol-based AuNPs as an innovative targeted therapeutic for PCa treatment. Isolated polyphenol compounds will be 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 *in vitro* and *in vivo* effects on PCa models. This project will reveal healthy and ecological polyphenol based-AuNPs on PCa progression, contributing to the development of a sustainable therapeutic network based on natural, environmentally friendly compounds reducing by-product waste.

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PP18 - A LITERATURE REVIEW ABOUT CONSUMER PERCEPTION OF FARMED FISH: CAN WE IMPROVE IT?

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Wild fish is still a reference for consumers, representing 72% of the EU's apparent per capita consumption of fishery products. Only 7% of European consumers report to prefer farmed products. Thus, a literature review was performed to investigate this matter.
Following the PRISMA approach and using the query "aquaculture AND fish AND consumer". 1067 records were retrieved from SCOPUS and 970 from Web of Science. Up to 694 duplicates were excluded, using the Endnote (v20.5; Clarivate, United Kingdom) software. Reports without an available full text, not in English, irrelevant to the research and reviews were excluded, resulting in a total of 134 papers selected for analysis.
The reviewed papers highlight a consumer preference for wild fish. Consumers believe that farmed fish contain harmful chemicals and are "unnatural". Wild fish is perceived as having better quality, despite blind sensory trials showing otherwise. This idea is further strengthened by its perceived higher price. Fisheries are seen as eco-friendlier and promoting better fish welfare. The low objective and subjective knowledge of consumers regarding aquaculture also stood out. Moreover, consumers tend to value domestic products. A growing interest in organic production and sustainable fish products has been observed.
Therefore, it is proposed, for the improvement of aquaculture perception: first, aquacultures must minimize the use of harmful chemicals and assure consumers of that; second, there should be a focus on eco-friendly farming processes; third, each region should promote their domestic aquaculture products; finally, clear information regarding aquaculture benefits should be disseminated to increase consumers' knowledge.

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PP19 - MARSOL *vs.* CA-90 – CONTRASTING PHYSIOLOGICAL RESPONSES OF TWO CHESTNUT VARIETIES TO CLIMATE CHANGE

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The cultivation of chestnut trees (*Castanea sativa*) has relied on grafting techniques using resistant genotypes aiming combat pests and diseases like ink disease. However, given the current climate instability, it is urgent to select genotypes capable of withstanding extended periods of drought and heat. This study compared how young chestnut plants (3 months old), from two varieties (Marsol and CA-90, both disease-resistant rootstocks), responded to single and combined drought (null irrigation) and heat (4 hours/day; 42°C) for 21 days. After this period, all stress conditions impaired Marsol's leaf area, but the relative water content was only decreased by drought, alone or in combination, while the leaves production was not affected. CA-90 plants were more affected, displaying higher inhibition rates across all biometric parameters. Photosynthetic performance mirrored these trends, with Marsol exhibiting fewer inhibitory responses in terms of chlorophyll fluorescence and gas-exchange parameters compared to CA-90. The oxidative stress markers reinforced these differences. While CA-90 showed elevated hydrogen peroxide levels under stress, Marsol did not demonstrated such variations. Additionally, Marsol had lower superoxide anion ($O_2^{\cdot-}$) levels and unchanged lipid peroxidation (LP) in all conditions. Contrariwise, CA-90 chestnuts exhibited increased $O_2^{\cdot-}$ levels under heat, alone or in combination, and higher LP under drought, indicating greater oxidative damage. Both varieties exhibited augmented proline levels, particularly under combined stress. Altogether, these findings suggest that the combination of heat and drought severely affects chestnut plants' physiology, with the CA-90 proving to be more susceptible, as evidenced by its growth performance, photosynthetic yield, and redox metabolism.

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PP20 - WINERY BY-PRODUCTS: SHIFTING FROM WASTE TO VALUABLE RESOURCE

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Winery by-products (WBP) are residual materials and substances that are generated in large quantities during the winemaking process with a negative environmental impact. These WBP include stems, pomace (seeds, skins, pulps), lees, rachis and vine shoots, all of which serve as sources of bioactive compounds. Approximately 30% of the grapes processed correspond to WBP, amounting to almost 20 million tons, with approximately half of this quantity originating from the European Union [1]. Portugal is the tenth-largest wine producer worldwide, with an annual production of 6.8 million hectoliters [2]. The *Região Demarcada do Douro* assumes the foremost position among all wine production regions in Portugal, accounting for 21% of the total wine production [3]. Generally, these WBP are rich in (poly)phenolic compounds, including phenolic acids, flavanols, flavonols, flavanonols, proanthocyanidins, anthocyanins, and stilbenes [1,4–6], revealing to be natural products with potential biological activities, both *in vitro* and *in vivo*. Hence, these often-overlooked by-products house valuable phytochemical compounds that can hold significant economic potential, with promising applications in the food, cosmetic, and pharmaceutical industries. This study aims to enhance the value of these by-products, with the analysis of the phenolic content, antioxidant capacity, and anti-aging activities within the various matrices.
It is expected with this work to unveil the potential applications of WBP from the wine production sector in the food, cosmetic, and pharmaceutical sectors. Hence, it will promote the valorization of these products, aligning with the principles of a circular economy, industrial symbiosis, and sustainability.

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PP21 - UNLOCKING THE HIDDEN POTENTIAL: BIOACTIVE COMPOSITION AND CULTIVAR INFLUENCE IN ALMOND BY-PRODUCTS FOR SUSTAINABLE APPLICATIONS

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The nutritious almond kernels that we consume grow within a brown shell, encased and safeguarded by a hull. During the production and industrial processing of almonds, shells, hulls and skins, are discarded and can represent more than 70% of the production volume, which translates into a large waste problem. This study aims to analyse the bioactive composition (total phenols, flavonoids and *ortho*-diphenols), and antioxidant activity (by the ABTS, DPPH, and FRAP methods) of four almond by-products (skins, shells, hulls, and blanching water), in four almond cultivars (cvs. Ferragnès, Ferraduel, Marinada, and Lauranne).

The results point to a significant influence of the cultivar on all evaluated parameters. The cv. Ferraduel stood out in the hulls and skins, presenting the highest values in all evaluated parameters, while in the shells the highest values were found in 'Ferragnès'. Regarding blanching water, 'Lauranne' showed high content of total phenols and flavonoids and in antioxidant activity by the DPPH method, however by the FRAP method the highest values were obtained in 'Ferragnés'.

In summary, this work demonstrated that almond by-products have bioactivities that enhance alternatives to their use/valorization, and can be explored in the pharmaceutical, cosmetic and food industries. Furthermore, it suggests that the cultivar has a decisive influence on their phenolic composition. Therefore, innovative, ecological, and sustainable studies and strategies that increase the value of these by-products must be encouraged and continue to be developed.

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PP22 - ANAESTHETIC PROFILE OF THYMOL AND MENTHOL USING ZEBRAFISH LARVAE

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Aquaculture practices induce stress in aquatic animals. Anaesthesia is one of the proposed strategies to minimize this stress during these procedures. Common anaesthetics as tricaine methanesulfonate (MS-222) (synthetic) and eugenol (natural) show stress-reducing potential, yet toxicity concerns persist. Thymol and menthol show promising anaesthetic effects in fish species, necessitating detailed exploration of their properties. Early-stage zebrafish use as a model offers transposition benefits, marked sensitivity, and ethical viability as an alternative aquatic model.

The objective was to evaluate thymol and menthol anaesthetic profile in zebrafish at 72 hours post-fertilization (hpf). After establishing appropriate anaesthetic concentrations, three concentrations (100, 200, and 300 mg L^{-1} for thymol; 200, 400, and 500 mg L^{-1} for menthol) were selected for further testing. This included assessing mortality rates, heart rate, behavioural features, and oxidative-stress related effects compared to MS-222 and eugenol. Both compounds exhibited concentration-dependent anaesthetic effects. At 200 mg L^{-1}, their profile resembled that of MS-222 and eugenol, though with varied anaesthesia depth and extended recovery times. Thymol and menthol-induced anaesthesia caused irregular motor patterns, suggesting potential anaesthesia-induced stress. While minor physiological and antioxidant changes were observed, attributing them to thymol and menthol anaesthesia remained challenging due to limited data on these fish early developmental stage. Overall, in order to support their anaesthetic application, further research is essential to understand the effects of these anaesthetics on fish behaviour and stress levels, enhancing the safety and efficacy of future anaesthetic procedures.

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PP23 - FOREST AND URBAN RESIDUES COMPOSTING-GREENVALUE PROJECT

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The production of sewage sludge (SS) and urban solid waste (UW) has been increasing following the urban population growth. These residues can harm the environment due to their heavy metal content, but on the other hand, their high organic matter concentration is a valuable resource. Through composting it is possible to obtain a usable and added value compost product, that contributes to circular economy, and reduces the amount of waste to be sent to landfill and incineration, and the burden on the environment. In present study, we aim at producing a stable and mature compost to help restoring degraded ecological forested areas of Alfândega da Fé, through the co-composting processes of SS, UW and sawdust (SD) as bulking agent. The trial consisted of four mixtures C, M1, M2, M3, containing different proportions of SS, UW and SD, with cattle slurry solid fraction used as inoculum. During the first 45 days of the composting process, every 15 days, samples were analyzed for total N, $N\text{-}NH_4^+$, $N\text{-}NO_3^-$, pH, organic matter (OM), electrical conductivity, and moist content. Temperature was evaluated daily, revealing that the thermophilic phase was reached on the seventh day of the process and remained above 40ºC at the end of 45 days. Results highlight the higher values of OM, pH and NO_3^-/NH_4^+ ratio for treatments with higher amounts SD, UW and SS, respectively. Subsequent time point analysis will bring further information on the development of the composting process.

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PP24 - ASSESSING GREENHOUSES' FUNCTIONAL BIODIVERSITY, TO PROMOTE CONSERVATION BIOLOGICAL CONTROL STRATEGIES AGAINST *PHTHORIMEA ABSOLUTA* (LEPIDOPTERA)

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The absence of effective control measures for the tomato pest *Phthorimaea absoluta*, Meyrick can cause yield losses of up to 100%, leading to an increase in spraying, which escalates populations' pesticide resistance. However, it is known that the establishment of pest's natural enemies can effectively reduce its incidence. The conservation biological control and enhancement of the arthropod natural enemies mostly depend on ecological infrastructures (EIs) existing near the greenhouses. So, the faunistic and floristic communities' assemblage and the trophic relationships established among them need to be clearly measured to validate conservation biological control (CBC).
This study examines the potential of CBC as an alternative to pesticide control of *P. absoluta*. For that, functional biodiversity (predators and parasitoids) will be characterized within and around three greenhouses, by: (i) visual prospection and sweep sampling of natural enemies; (ii) parasitism evaluation using tomato sentinel plants infested with pest larvae, placed near EIs; (ii) determining gut contents of predators through metagenomics allowing to establish predatory link with the pest. Also, flora biodiversity will be assessed on the EIs. We expect that a trophic link between NEs present in specific companion plants and the pest will be observed by determining functional beta diversity parameters, hence characterizing the interactions between EIs, NEs and pest control. In the future, a specific design of IEs with selected companion plants needs to be further understood and replicated on farms to promote CBC.

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POSTER PRESENTATIONS

PO1 - ASSESSMENT OF EMBRYONIC DEVELOPMENT OF ZEBRAFISH (*DANIO RERIO*) EXPOSED TO A MIXTURE OF PSYCHOACTIVE SUBSTANCES

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The presence of psychoactive substances (PAS) in the environment has been reported worldwide threatening the health of non-target species. However, studies focusing on the adverse effects of mixtures of PAS in aquatic organisms are scarce. This represents a serious lack of information since aquatic organisms are exposed to diverse environmental chemicals. This study aimed to evaluate the potential effects of a mixture of six PAS on the embryonic development of zebrafish (*Danio rerio*).
Zebrafish embryos were exposed to a mixture of six selected PAS for 96 hours. Briefly, a stock solution was previously prepared and successive dilutions (concentration 5 – 1:10; concentration 4 – 1:100; concentration 3 – 1:1000; concentration 2 – 1:10000; concentration 1 – 1:100000) were realized. Five experimental groups were tested including environmental reported levels. Different morphological and lethal parameters were evaluated during exposure. At the end of the exposure, animals were collected to evaluate oxidative stress-related parameters. After 24 hours, behavioural responses were also evaluated.
No significant differences were observed in the morphological and mortality parameters. Regarding biochemical parameters, CAT activity showed a significant decrease in the C5 group compared to the control and C1 groups. Considering the GST activity, the exposed groups C2, C4 and C5 showed a significant decrease compared to the control and C1 groups. The inactivation of these enzymes may suggest that PAS mixture exposure imbalanced the antioxidant activity [1]. No significant alterations were observed in the behavioural responses. Future studies should be performed to understand the potential cellular and molecular mechanisms underlying these changes.

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PO2 - THE IMPACTS OF VITICULTURE PRACTICES ON SOIL BIODIVERSITY: NEW KNOWLEDGE INSIGHTS FROM THE FIELD FOR A BETTER AWARENESS OF PRODUCERS

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Organic management practices are gaining prominence in the wine sector, with some of the most prestigious wineries converting part of their production to organic viticulture, which focuses on improving soil biodiversity, moving to more sustainable practices, and producing high-quality crops, all of which have a direct impact on wine quality. The economic relevance of wine production makes it necessary for companies to invest in scientific research and in the development of new practices and methodologies, which will promote higher productivity with lower costs and environmental impacts. The main objective is to compare the effects of conventional and organic practices on soil properties, microbiome, and functional and structural biodiversity of soil meso and macrofauna in the vineyards of Real Companhia Velha (Douro Region, Portugal), in parallel with vine production parameters (vine yield and disease incidence), and to obtain a holistic analysis of the impacts of wine production modes on soil health providing perspectives for sustainable viticulture. It is envisaged to contribute to the transmission of knowledge and simple protocols to the company, allowing the implementation of the applicable methodology to make the organization self-sufficient for routine analysis and/or their results interpretation.

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PO3 - BIO-BASED COMPOUNDS FOR A SUSTAINABLE CONTROL OF GREY MOULD DISEASE IN STRAWBERRY PLANTS

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Grey mould (GM) disease, caused by *Botrytis cinerea*, severely affects strawberry production requiring frequent applications of synthetical fungicides, which has serious negative impacts on environmental and human health. Since several bio-based compounds can act as elicitors of plant defense mechanisms when exogenously applied, it is highly important to explore their mode of action. This study aimed to evaluate and understand the efficiency of four phytohormones, salicylic acid (SA), jasmonic acid (JA), and of their methylated forms (MeSA and MeJA), on GM disease in strawberry. Firstly, detached strawberry (*Fragaria* × *ananassa* cv. '*San Andreas*') leaves were treated with different concentrations of phytohormones and induced resistance was evaluated. Thereafter, the most effective concentrations of the four phytohormones were applied during strawberry cultivation in greenhouse, through four applications performed every two weeks, from vegetative to flowering stage. Results showed that JA, MeJA and MeSA were able to significantly reduce disease on detached leaves ('*in vitro*' infection). Moreover, both SA and JA had antagonistic effects on *B. cinerea* (fungal growth assay). Finally, it was also found that these phytohormones stimulated ROS production (H_2O_2 and O_2^-) during the infection process, likely causing an augmentation of plant immune responses, decreasing susceptibility to *B. cinerea*. These results suggest that these phytohormones may play a role on controlling GM disease by targeting plant defenses and/or pathogen virulence mechanisms, which could be highly relevant to integrate these bio-based compounds on sustainable approaches for disease management.

PO4 - FEASIBILITY OF PRE-COMPOSTING VINE PRUNING RESIDUES AND SEWAGE SLUDGE FOR VERMICOMPOSTING

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Agriculture and agro-based industries generate large amounts of waste and by-products, creating significant environmental, ecological, and economic challenges. The conversion of these unused residues into useful end products through vermicomposting is a valuable option for recycling and valorization of such residues. In this context, the present work aimed to evaluate the viability of pre-composting different sub-products, such as vine pruning residues, and sewage sludge, to avoid earthworm mortality and also accelerate the vermicomposting process. Three mixtures containing varying proportions of these residues (M1, M2 and M3) were tested in 135L reactors. The sewage sludge was introduced 15 days after the start of the process, which was carried out for 90 days. Electrical conductivity (EC), pH, and moisture of compost samples were determined at four time points (0, 15, 47 and 90 days). Temperature inside the reactors was monitored daily using thermometers placed in the center of each pile. Results showed that all parameters depended on the mixtures used and the composting time. EC was higher in M1, whereas pH was higher in M3. Throughout the composting period, the highest values of pH and temperature were observed on the 47th day. On the contrary, the highest EC and moisture were obtained at the beginning and at the end of the composting period, respectively. The mixtures also presented a different pattern over the entire period. These preliminary data suggest that all studied mixtures are suitable for vermicomposting. However, further analysis will be necessary to evaluate the final compost quality of each mixture.

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PO5 - LESS MEAT ON THE PLATE: AN EXPLORATION OF CULINARY AND CONSUMER DRIVERS FOR INCREASING THE CONSUMPTION OF CHICKPEAS IN FAMILY MEALS

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Food production systems in a farm-to-fork supply chain are responsible for one-third of all anthropogenic greenhouse gas emissions. In this context, legumes play an essential part in promoting healthy diets, having minor impacts on GHG emissions, water usage, and soil nitrogen balancing, and being thus one of the most efficient ways to produce proteins for human consumption. The present study offers insights into the preferences and motives of consumers regarding traditional and innovative chickpea-based dishes and how gastronomic innovation can be used to increase legume consumption. Soft laddering interviews were done with 42 legume consumers from the North of Portuguese (24 females, 18 males, mean age 37.4±7.1 years). Hot dish recipes (one traditional and one innovative per dish) were scored according to respondents' acceptance and these evaluations were used to elicit attributes driving dish preferences, to serve as a starting point for laddering. Two authors independently content-analyzed interview transcripts in NVIVO and consensually compiled a list of the attributes (concrete and abstract), consequences and values associated by respondents to each dish, as well as the direct links made between them. Resulting links show that motives related to health, diet and weight management, satiation, variety-seeking and liking were associated with legume consumption in general and relative preferences for stimuli in particular. Such motives were driven by personal values, like self-esteem, health status and well-being, stimulation, pleasure, and care for the family. These findings provide opportunities for more targeted and effective promotion of traditional and innovative legume-based meals.

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PO6 - PRELIMINARY RESULTS OF CO-COMPOSTING SEWAGE SLUDGE AND VINE PRUNING RESIDUES

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Sewage sludge (SS) and vine pruning (VP) wastes are produced in large amounts every year and their recovery is encouraged by European and national legislations, contributing to achieve circular economy. Despite these materials being a relevant source of nutrients for crops, their direct application to soil, without previous treatment, can influence soil quality, namely the mineralization-immobilization N turnover processes: composting is a viable alternative for their correct stabilization and sanitation thus contributing to the safe disposal and the creation of a product with increased agronomic value. The present study aims to determine the feasibility of co-composting sewage sludge and vine pruning. The trial was set up considering three mixtures with different proportions of SS and VP, based on their C:N ratios and moist content: CM1, CM2 and CM3, in which cattle slurry solid fraction (CS) was used as inoculum. Temperature (T) was checked daily, for 90 days, and periodically samples were taken to electrical conductivity (EC) and pH evaluation. The results show that CM1 reached the temperature peak in the thermophilic phase at 19 days, earlier than CM2 and CM3 (27 and 28 days, respectively). The same trend was observed for pH and EC, suggesting that higher amounts of SS present in CM1 promote a faster biodegradation of the readily available substrates. In all the treatments temperature reached values higher than 60^{o}C, allowing elimination of pathogenic microorganisms, namely those responsible for trunk wood diseases of grapevines. Further data are needed to support these conclusions.

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PO7 - MEDITERRANEAN DIET SUSTAINABILITY ASSESSMENT – THE INDICATORS USED AND ITS RESULTS

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The Mediterranean food pattern stands distinguished as a paradigm of sustainable lifestyle. This systematic literature review aimed to identify the indicators used to assess the sustainability of the Mediterranean diet and presenting their application results. Methodologically guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, searches were conducted in PubMed, Scopus, Web of Science, and GreenFile. In total thirty-two articles evaluating the sustainability of the Mediterranean diet were identified. Of these, twenty-five studies made a quantitative evaluation of environmental impact, seven evaluated the nutritional quality, and twelve assessed the daily cost of the diet. An overall of thirty-three indicators were identified and separated by four dimensions of sustainability. The environmental dimension incorporates ten indicators, most notably the carbon, water, and ecological footprint. The nutritional dimension encompasses eight indicators, including the Health Score and Nutrient Rich Food Index. The economic dimension is generally assessed by a singular indicator, the dietary cost. Only eight of the studies adopted composite indicators. The carbon footprint ranged between 0.9 and 6.88 kg CO_2/d per capita, the water footprint between 600 and 5280 m3/d per capita, and the ecological footprint between 2.8 and 53.42 m^2/d per capita. The nutritional quality was high, obtaining 122 points using the Health Score, and 12.95 to 90.6 points using the Nutrient Rich Food Index. The cost of Mediterranean diet did not significantly differ from other diets and varied between 3.33 and 14.42€/d per capita. These findings show that no consistency in assessing the MDiet's sustainability exists.

P08 - INTEGRATION OF ADVANCED METHODS FOR EVALUATING CONSUMER RESPONSE TO INNOVATIVE FOOD PRODUCTS, CONSUMED IN DIFFERENT CONTEXTS, WITH INTEGRATION OF THE "PORTUGALITY" CONCEPT - A PhD PROJECT OVERVIEW

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Despite the globalization of food consumption that has occurred in recent decades, consumers continue to differentiate themselves through their cultural identity. Thus, traditional food products have been sought as a source of inspiration for food innovation. In the case of Portugal, a country with a wide variety of traditional products and a rich and unique gastronomic heritage, there is a lack of research into the role of the perceived food-related cultural heritage on consumers' valorisation of such products. Therefore, it is important to better understand intrinsic, extrinsic and even emotional-related factors that lead to the acceptability of traditional Portuguese products, to promote the development of more successful innovative ones.

The use of sensory analysis allows the study of the intrinsic properties of these products. However, despite the benefits, evaluation under standard laboratory conditions is unable to mimic the impact of the consumption environment. This PhD thesis attempts to overcome this problem by conducting descriptive and hedonic profile tests with innovative Portuguese products (in the categories of charcuterie, beers, fruit juices, cheese and traditional sweets) and assessing the impact of the context, recuring to immersive mixed reality environment, such as video walls and head-mounted displays. Moreover, the project aims to evaluate the impact of repeated exposure at the place of consumption, with the creation and validation of IT solutions for collecting qualitative and ethnographic information from the participants.

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PO9 - ROLE OF NUTRITIONAL REGIME, CULTIVATION SYSTEM AND MICROBIOME TOWARDS SUSTAINABLE STRAWBERRY PRODUCTION

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Strawberries (*Fragaria* × *ananassa* Duch) hold a pivotal importance in the global fruit production, due to their attractive colour, taste, nutritional properties and versatility for fresh consumption and processing. However, this fruit is often in the top list of the fresh products as one of the "dirtiest" fruits available in the market, highlighting concerns over pesticide residues and environmental impact. In light of increasing competition within the agricultural sector, European Union directives on the need for reducing chemical fertilizers' applications and ever-discerning consumers, the strawberry production sector faces the compelling challenge of meeting the demands for a heathier and residue free product. The primary objective of this doctoral research plan is to promote sustainable strawberry production targeting at high fruit quality (in terms of physicochemical, nutritional, and sensorial aspects) with low-level of chemical residues. To achieve this, several environmentally friendly strategies have been tested. Specifically, this study investigated the efficacy of enhanced nutritional regimes, including biostimulants, calcium, and silicon, as well as alternative cultivation systems, comparing soil-based methods with soilless approaches. Moreover, this research will delve into the intricate relationship between these strategies and the strawberry plant's microbiome, exploring the potential benefits and drawbacks of these approaches on the microbial environment. Part of the results obtained so far will be presented, namely the impact of the nutritional regime and cultivation system on the microbiome. It was concluded that the soil bacterial community diversity and composition were strongly affected by the production system, whereas the nutritional regime had a minor impact.

PO10 - USE OF GRAPEVINE DIVERSITY FOR SUSTAINABLE PRODUCTION

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The grapevine (*Vitis vinifera* L.) is one of the most important crops worldwide. This species is known by having a large variation between and within varieties in terms of yield, quality traits of the must, as well as on stress tolerance and symbiotic organisms. This biodiversity must be preserved and studied for benefit of the end-users, the vine and wine industry. Due to climate change, stricter environmental legislation and more globalized and competitive markets, the wine industry is facing new challenges. Climate change is creating more frequent extreme events (e.g. heat waves), leading to scarcer water resources and soil degradation. Severe drought in combination with high evaporative demand impairs vines' survival and longevity and anticipate phenology by several days while warmer and dryer ripening periods modify berry composition, increasing alcohol contents and affecting compounds in the grapes that contribute to flavour and aroma, thus altering wine sensory profiles. Therefore, there is a demand for varieties and genotypes more tolerant to abiotic stress and resistant/tolerant to biotic stress. By exploring diversity of autochthonous varieties, it is possible to respond to the constraints previously referred, identifying the most promising genotypes for new scenarios, more tolerant to biotic and abiotic stresses in different environments. This strategy will allow the use of traditional varieties that can guarantee a historical mark and add value to top quality wines.

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PO11 - ULTRAVIOLET LIGHT INFLUENCES THE SYNTHESIS OF ANTI-NEOPLASTIC COMPOUNDS IN *Catharanthus roseus*

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Catharanthus roseus is a medicinal plant renowned for its production of terpenoid indole alkaloids (TIAs), including the valuable anticancer compounds vinblastine and vincristine. These alkaloids have played a pivotal role in cancer therapy and remain vital in current treatments. Given their low concentrations in the plant, understanding the impact of light on TIA synthesis is essential. This study investigates how different types of ultraviolet light [UV-A: 365 nm and UV-C: 250 nm], and different durations of UV-A exposure (2h, 4h, and 6h) impact growth and alkaloid synthesis in three *Catharanthus roseus* cultivars. Plants were cultivated for 28 days in climate chambers set at 24.5°C with 80% relative humidity. Our findings reveal that UV-C significantly enhances the production of antineoplastic alkaloids by 125%, resulting in 0.075 mg per plant fresh weight, compared to UV-A and control plants. However, the application of UV-C leads to a significant 58% reduction in total dry matter compared to the control and UV-A treatment. When analyzing the exposure times of UV-A, we observed varying responses among cultivars concerning the final total dry matter under distinct UV-A treatments. Regarding antineoplastic alkaloid production, we determined that the specific combination of the C-Red cultivar with 4 hours of UV-A exposure led to a 229% increase compared to other cultivars and treatments, resulting in a total of 0.04 mg per plant fresh weight. It was concluded that while UV-C clearly improves alkaloid production, it comes at the cost of diminishing the plant biomass due to its stress-inducing effects.

PO12 - SUSTAINABLE MANAGEMENT TOOLS FOR *PSEUDOMONAS SYRINGAE* PV. *ACTINIDIAE* MITIGATION IN KIWIFRUIT

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Worldwide kiwifruit (*Actinidia chinensis*) production has been severely affected by the Kiwifruit Bacterial Canker (KBC) caused by *Pseudomonas syringae* pv. *actinidiae* (Psa), following a series of outbreaks in all main producing countries. So far, the few methods available to control KBC are still ineffective and mostly based on copper compounds and antibiotics, which have shown important drawbacks. Hence, the PhD program "Act-ON Psa" aims at developing sustainable Psa control methodologies, focused on enhancing plant defense mechanisms and/or suppressing Psa virulence through application of plant elicitors and antimicrobial molecules of natural origin. Moreover, this program aims to apply precision agriculture tools for early KBC detection, including hyperspectral technology to assist in disease management. Part of the results obtained so far will be presented, namely the dynamics of Leaf Spectral Reflectance (LSR) following controlled Psa kiwifruit plant inoculation. To that end, six-month-old *A. chinensis* var. *deliciosa* 'Hayward' plants were grown in a controlled environment and a follow-up monitoring of LSR and visual symptoms´ progression was performed until 14 days post inoculation (dpi). Moreover, the plants´ photosynthetic rate was determined at 7 and 14 dpi. Wavebands within the ultraviolet and visible regions of the electromagnetic spectrum were found to be indicative of Psa-infection before symptoms´ appearance (≤5 dpi), whereas wavebands within the near-infrared region (>700 nm) were associated with symptoms´ progression. Hence, LSR analysis seems to be a valuable tool for early detection of Psa, allowing anticipated sanitary measures.

PO13 - EVALUATION OF THE POTENTIAL TOXICITY OF BUTYLONE IN ZEBRAFISH LARVAE THROUGH BIOCHEMICAL BIOMARKERS

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The emergence of new psychoactive substances (NPS) in the worldwide drug market raises concern over the public health, drug policy and also environmental concern. Butylone (BTL) is a synthetic cathinone reported in wastewaters effluents and despite its increasing presence in freshwater ecosystems, no studies were found on the BTL toxic evaluation in fish, including the well-known zebrafish (*Danio rerio*) model. *D. rerio* is used to investigate the potential adverse effects of numerous types of chemicals toxics, including NPS, specifically during early-life stages.

The main objective of this work was to evaluate the potential toxic effects of BTL at the enzymatic and non-enzymatic biomarkers levels. Zebrafish embryos with ≈ 3 hours post-fertilization were exposed for 96 hours to different concentrations of (R,S)-BTL (0.01, 0.1, 1, 10 and 100 μg/L). After exposure, 30 larvae from each treatment concentration were collected to assess the effects on reactive oxidative species, enzymatic biomarkers (superoxide dismutase, catalase, glutathione peroxidase, glutathione reductase, lactate dehydrogenase, acetylcholinesterase, and glutathione S-transferases) and non-enzymatic biomarkers (protein carbonyls, thiobarbituric acid reactive substances, reduced glutathione and glutathione disulphide).

No significant effects were observed on the different biomarkers studied. These findings suggest that the exposure to environmental relevant concentrations of BTL (0.1 μg/L) during early life stages may not induce oxidative damage neither alter the redox homeostasis, reflecting no adverse effects. However, further research is needed to investigate deeper the impacts of BTL on other biomarkers, like genotoxicity, behaviour changes, apoptosis, among others, and consequently improve environmental risk assessment.

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PO14 - STRESS SIGNALLING OR DEFENCE MECHANISM: THE UNKNOWN ROLE OF PROLINE IN GLYPHOSATE-INDUCED TOXICITY

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Glyphosate (GLY) stands out as the most widely used herbicide in the world, typically being foliar applied and working in a non-selective and systemic manner upon seedling emergence. The constant use of this compound has led to several scenarios of soil contamination. When absorbed by non-target plants, GLY affects their growth and disrupts redox homeostasis, leading to excessive proline (Pro) accumulation. Therefore, this study aims to determine whether the accumulation of Pro in response to GLY is considered a tolerance mechanism or a stress signal. For this, *Arabidopsis thaliana* T-DNA insertional mutant lines for genes involved in the Pro pathway (*P5CS1* and *ProDH*) were screened to assess their GLY sensitivity. After a 14-day exposure to GLY (0.75 mg/L), all genotypes consistently showed a reduction in fresh biomass, this being subsequently accompanied by an exacerbated accumulation of Pro. Interestingly, mutant plants with higher Pro levels exhibited the highest rates of growth inhibition among the genotypes. Notably, the assessment of the antioxidant machinery revealed that mutants with lower Pro accumulation (*p5cs1-1* and *p5cs1-4*) showed a stronger activation of the AOX system, both enzymatic and non-enzymatic components, preventing oxidative damage and reducing GLY-induced growth inhibition. In contrast, mutants with higher Pro accumulation (*prodh*) displayed a weakened antioxidant response, together with a significant increase in lipid peroxidation and H_2O_2 levels. Overall, data suggest that Pro overaccumulation is more likely perceived as a stress signal than a defensive mechanism.

PO15 - INFLUENCE OF LIKING ON THE DISCOURSE CHARACTERISTICS REGARDING PERCEPTIONS OF CHOCOLATES AND PLANT-BASED DRINKS

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Language is the most common way people translate their thoughts, feelings and emotions. Words reflect what people pay attention to, what they think about, and what they try to avoid and feel. Thus, variations in different language characteristics can provide information about consumer behaviour. The aim of this study is to explore the relevance of speech characteristics on the acceptability and perception of food products.
For this study, three plant-based drinks (almond, soya, pea) and three chocolates of different origins (Brazil, Ghana, Madagascar) were used as stimuli. Forty-five participants were voluntarily recruited for this study. Within a standardised sensory evaluation lab, participants individually tasted the products, evaluated overall liking following a 7-point anchored scale and answered an open-ended question on product characteristics, describing the product and indicating what they thought of it. This test was conducted orally and with the help of a microphone. The products were presented in a balanced sequential monadic way, for each category.
Chocolates were significantly more liked than plant-based drinks ($p<0.001$). Beyond simple liking, it was possible to observe significant differences in relation to standard linguistic dimensions, such as the association of chocolates to the second (You) and third person (They), reinforced by an association with the concept of socialisation (Social), versus an association of the first-person verb tenses (I) to plant-based drinks.
Although this is a preliminary study, the discourse characteristics may present potential value to explore consumer acceptance beyond direct overall liking.

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PO16 - INCORPORATION OF EDIBLE INSECTS' PROTEIN AND FORMULATION OF INSECT-BASED FOODS: DEVELOPMENT OF A SYSTEMATIC REVIEW ON THE IMPACT ON TECHNO-FUNCTIONAL PROPERTIES

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Recently, the food market has seen a greater demand for products with alternative more sustainable proteins [1, 2], such as insects and other novel and non-conventional protein sources, which have risen in popularity. However, there are still multiple challenges to the implementation of insect-based foods, such as technological limitations [3, 4]. The main goal of this work is to develop a systematic review on the impact of the incorporation of edible insects on the techno-functional properties of food products.
To perform this review, the PRISMA methodology was followed [5], and the searches were conducted in two online databases (Scopus and Web of Science). No restrictions were applied on the publication date or the language of the article. References of included studies and review papers concerning the techno-functional properties of insect-based products were screened to confirm the correct application of the database search.
The query used was identical across databases and resulted in a total of 8746 articles (5035 from Scopus and 3711 from Web of Science), from which 1520 duplicates were removed; thus 7226 articles were screened through title/abstract reading. Only articles concerning the review theme were selected to be screened through full-text reading. Thereby, articles were excluded if they were: not available (full text), not in English, review/conference papers. Additionally, relevant review articles were screened for additional relevant references, which were later included.
It is expected that this review will contribute to the field of insect-based foods and to support researchers in the development of novel sustainable products.

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PO17 - ASSESSMENT OF PRE-EMERGENT HERBICIDAL POTENTIAL OF YOUNG *EUCALYPTUS GLOBULUS* LEAVES AND ITS ENVIRONMENTAL SAFETY – A FIELD STUDY

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Modern agriculture heavily depends on synthetic pesticides to eradicate pests and pathogens. However, while these chemicals are undoubtedly effective, their extensive use has led to severe environmental drawbacks, including the development of weed resistance and soil contamination, potentially resulting in non-target toxicity. Thus, it is necessary to find new sustainable strategies for effective weed management without incurring long-term negative consequences. As so, the primary hypothesis of this study was to determine whether the allelopathic properties of *Eucalyptus globulus* Labill leaves can be used as a potential herbicide (hereby named EucaBio). Following up on our previous studies, young *E. globulus* leaves were incorporated into an agricultural soil [2.5% (m/m)] under open-field conditions. The results indicated that EucaBio application led to a significant reduction in weed growth and proliferation, even surpassing the action of a synthetic herbicide. Moreover, to ensure the environmental safety of EucaBio on crops, maize (*Zea mays* L.) seeds were sown after 30 days of EucaBio application and allowed to grow for 12 weeks until maturation. Our observations support the use of this product, as plants grown in soils amended with EucaBio reached the same developmental stage of those grown in non-treated soils. Additionally, there were no observed impacts on the plant's physiological status, since no alterations were noticed in terms of photosynthetic pigments nor redox biomarkers. Taking all of this into consideration, this study highlights EucaBio's potential as a strong sustainable alternative to synthetic herbicides, as it efficiently impaired weed development without compromising crop health.

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PO18 - CLIMCAST. PREDICTING THE BEHAVIOUR OF CHESTNUT CULTIVARS GRAFTED ON COLUTAD UNDER DIFFERENT EDAPHOCLIMATIC CONDITIONS

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Anthropogenic climate change (ACC) are anticipated to raise the Earth's average temperature by 1.8 to 6.0˚C by 2080, while precipitation would decrease 22% compared to the peak of the Industrial Revolution. In Portugal the hot waves of July leaded to a decrease on chestnut production by about 50% in 2022 compared to the record production of 43 841kt in 2019. ClimCast is the Portuguese chestnut network constituted by seven demonstration orchards (DO) replica, installed in 2018, covering the main producer regions. With the aim to performing studies with chestnut cultivars under edaphoclimatic contrasting conditions.

Here, there are presented first results obtained during July, on DO-P_B (T_{midday} = 32˚C), DO-CM_{Va} (T_{midday} = 30˚C), DO-PB_P (T_{midday} = 28˚C) and DO-PE_M (T_{midday} = 30˚C), on eight Portuguese and 2 Spanish cultivars, all grafted on the hybrid rootstock ColUTAD. Highest photosynthetic rates (A) were measured in DO-CM_{Va} and DO-PE_M, 11.2µmol $CO_2.m^{-2}.s^{-1}$ and 10.9µmol $CO_2.m^{-2}.s^{-1}$, respectively. Concerning midday stem water potential (Ψw_{md}), they were -1.2MPa and -0.78MPa, respectively, indicating a buffer capacity of A concerning these Ψw_{md} range values. Relating to cultivars and the impact of ColUTAD on them, A was 33% (Judia), 29% (Longal), 22% (Martaínha), and 12% (Pilonga) higher than in ungrafted ColUTAD, while in what concerns Ψw_{md} was 15% (Judia), 9% (Longal and Martaínha) lower than ColUTAD, while Pilonga shown 6% higher. These results demonstrate the impact of the edaphoclimatic conditions on chestnut development, and the utility of the installation of ClimCast network to deep the knowledge about local and cultivar potentialities.

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