Série | Serie 2 • Ano | Year 6
julho · July 2021

en

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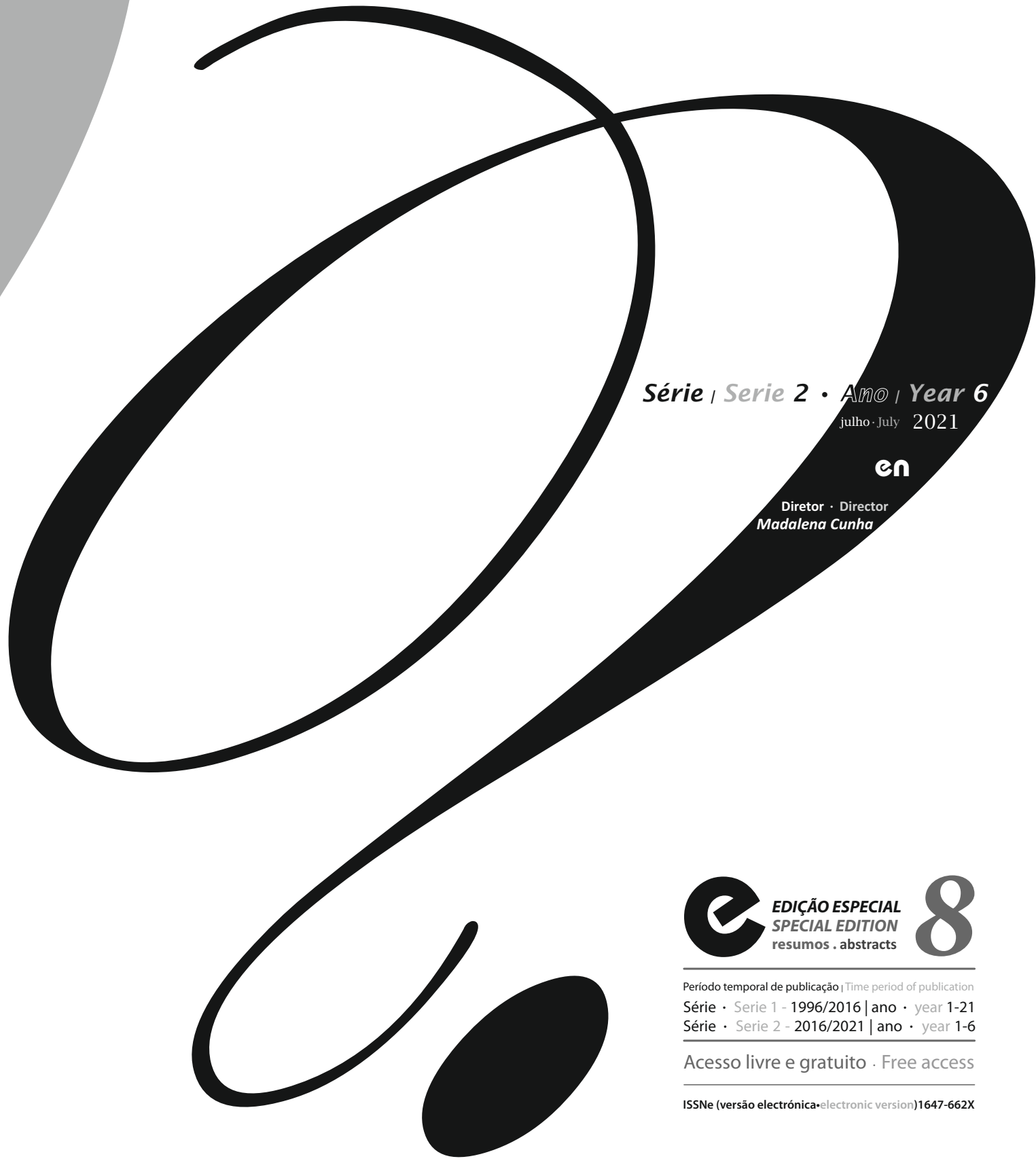

EDIÇÃO ESPECIAL
SPECIAL EDITION
resumos . abstracts
8

Período temporal de publicação | Time period of publication
Série · Serie 1 - 1996/2016 | ano · year 1-21
Série · Serie 2 - 2016/2021 | ano · year 1-6

Acesso livre e gratuito · Free access

ISSNe (versão electrónica•electronic version)1647-662X

DataCite · Repositório · Dialnet · latindex · DOAJ DIRECTORY OF OPEN ACCES JOURNALS · INTERNATIONAL Scientific Indexing

millenium
Journal of Education, Technologies, and Health

Ficha Técnica | Technical Sheet | Ficha Técnica

Propriedade | Property | Propiedad

Politécnico de Viseu (PV)
NIPC – 680033548
Centro de Estudos em Educação, Tecnologias e Saúde
Unidade de I&D do Instituto Politécnico de Viseu

Sede do Proprietário/Editor/Redator/Impressor | Owner´s Headquarters/Publisher/Writer/Printer | Sede del Proprietario/Editor/Redactor/Impresor
Av. Cor. José Maria Vale de Andrade
Campus Politécnico
3504- 510 VISEU

232 480 700 (ext.2100)
millenium@sc.ipv.pt (Revista Millenium)
http://www.ipv.pt/millenium/ (Revista Millenium)
http://www.ipv.pt/ci(Centro de Estudos em Educação, Tecnologias e Saúde (CI&DETS)- Unidade de I&D do Instituto Politécnico de Viseu)

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Ficha Catalográfica | Catalogue File | Ficha Catalográfica
Revista Millenium / prop. Instituto Politécnico de Viseu, 1996- 2021

Título da Revista | Journal title |Título de la Revista: Millenium- Revista do Instituto Politécnico de Viseu (IPV)
Título da Revista abreviado | Abbreviated title of the Journal | Título de la Revista abreviado: Rev. Mill
Sigla da Revista | Acronym of the Journal |Sigla de la Revista: Mill
Depósito Legal Nº | Legal Deposit |Depósito Legal: 973 71/96
Número de Registo ERC | ERC Registration Number | Número de Registo ERC: "Anotada"
Estatuto Editorial | Editorial Status | Estatuto Editorial: Estatuto Editorial da Revista Millenium (*http://revistas.rcaap.pt/millenium/pages/view/estatuto*)

ISSNe (versão eletrónica) 1647-662X

Acesso livre e gratuito para autores, revisores e leitores | Free access to authors, rewiers and readers | Acceso libre el autor, revisores e lectores

Periodicidade | Publication Frequency | Periodicidad
Quadrimestral, sendo editada em fevereiro, junho e outubro | Quarterly released in February, June and October | Cuatrimestral, siendo editada em febrero, junio y octubre

Período temporal da publicação | Temporal period of publication | Período de tiempo de publicación
Série 1- 1996- 2016 | ano 1- 21
Série 2- 2016- 2021 | ano 0- 6

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Journal of Education, Technologies, and Health

Indexação | Indexation | Indexación

- **Repositório Científico do Instituto Politécnico de Viseu** – http://repositorio.ipv.pt/
- **DIALNET –** http://dialnet.unirioja.es/
- **Latindex –** Sistema Regional de Información en Línea para Revistas Científicas de América Latina, el Caribe, España y Portugal http://www.latindex.unam.mx/index.html
- **DOAJ –** Directory of Open Access Journals – http://www.doaj.org/

Avaliada por Qualis/CAPES | Qualis/CAPES Assessment | Evaluado por Qualis/CAPES

ÁREAS DE AVALIAÇÃO EVALUATION AREAS ÁREAS DE EVALUACIÓN	2012 CLASSIFICAÇÃO CLASSIFICATION CLASIFICACIÓN	2013 CLASSIFICAÇÃO CLASSIFICATION CLASIFICACIÓN	2014 CLASSIFICAÇÃO CLASSIFICATION CLASIFICACIÓN	2013-2016 CLASSIFICAÇÃO CLASSIFICATION CLASIFICACIÓN ISSN 0873-3015	ISSN 1647-662X (versão eletrónica)	2017-2018 CLASSIFICAÇÃO CLASSIFICATION CLASIFICACIÓN ISSN 1647-662X (versão eletrónica)
Educação **Education** **Educación**	B2			C	C	
Filosofia/Tecnologia: Subcomissão de Filosofia Philosophy/Theology: Philosophy Subcommittee Filosofía/Teología: Filosofía subcomité	B5					
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Manuela Ferreira[1], Ana Paula Cardoso[2], Raquel Guiné[3], José Luís Abrantes[4]

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The special edition of the Millennium Journal publishes the abstracts of the plenary sessions and communications (oral and poster) presented at the "International Conference on Multidisciplinary Research - CMR", which took place in a hybrid format, and whose program was developed under four thematic lines: education, technologies, health and agrarian sciences, corresponding to the central areas of activity of the Polytechnic of Viseu's R&D Units.

Inclusive education and information and communication technologies were the themes of the invited plenary talks by José Fernández Batanero (University of Seville) and Bárbara Mariana Gutiérrez Pérez (University of Salamanca), in the area of Education. “Literacy and Mental Health in Higher Education Students” and “Promotion of Health, Literacy and Lifestyles in Higher Education” were the titles of the invited interventions by Carlos Sequeira (School of Nursing of Porto, Cintesis) and Ana Rita Pedro (National School of Public Health). Agricultural Sciences and Technologies were the thematic lines of the second day of the Conference. Invited talks in the areas of food science and technology, given by Elena Bartkiene (Lithuania University of Health Sciences), and sustainable agriculture, by António Dinis Ferreira (Cernas – Polytechnic Institute of Coimbra), were the starting point for the debate that took place during the morning. Barry Feeney (Dublin Institute of Technology) and Ana Lúcia Ferreira (Veolia Water Technologies Techno Center Netherlands B.V.) were the invited speakers who, in the afternoon, spoke about the connection between polytechnic institutes and companies and the treatment of industrial water, respectively.

Over the two days, the meeting promoted, simultaneously, the presentation of communications, oral and digital, in parallel sessions, resulting from a broad "open call" with the participation of researchers from 11 countries (Brazil, Cape Verde, Canada, Spain, United States of America, Ireland, Lebanon, Lithuania, Poland, Romania, Sri Lanka).

This Congress provided an opportunity for learning and scientific growth, through the dissemination and sharing of science, having an expected impact on the scientific community and society in general.

The Organizing Committee of the CMR
Manuela Ferreira, *Ana Paula Cardoso*, *Raquel Guiné*, *José Luís Abrantes*

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Journal of Education, Technologies, and Health

Sumário | Summary | Resumen

AGRICULTURAL SCIENCES, FOOD AND VETERINARY

61 DEVELOPMENT OF A NEW PASTA PRODUCT INCORPORATING CHESTNUT FLOUR AND BEE POLLEN
62 FROM DRIED CHESTNUTS TO HYDRO-SWEET CHESTNUTS
63 PERCEPTION ABOUT FOOD FRAUD AND LABELLING
64 PRODUCTION OF HYPER SOFT BREADS WITH CASTANEA SATIVA FLOUR FOR FAST FOOD CHAINS
65 PHYSICAL AND CHEMICAL PROPERTIES OF SOME HAZELNUT VARIETIES GROWN IN PORTUGAL
66 FIRST CHARACTERIZATION OF THE COMPOSITION OF STRAWBERRY TREE FRUIT SPIRIT AGED WITH OAK WOOD
67 LYCOPENE: SOURCES, BIOAVAILABILITY AND EFFECT ON HUMAN HEALTH
68 INFLUENCE OF DIFFERENT PARAMETERS ON THE CHARACTERISTICS OF HAZELNUTS (VAR. GRADA DE VISEU) GROWN IN PORTUGAL
69 APPLICATION OF NIR AND DECISION TREES TO DIFFERENTIATE PEAR FRUIT FILLING
70 STUDY OF SOME BIOLOGICAL ACTIVITIES OF 9 ALMOND CULTIVARS NATIVE FROM ALGARVE REGION
71 CHARACTERIZATION OF PHYSICOCHEMICAL PARAMETERS OF “AMARELO DA BEIRA BAIXA”
72 DETERMINATION OF SHELF LIFE OF TABLE OLIVE FLOURS PRODUCED FROM COBRANÇOSA CULTIVAR
73 EFFECT OF USING MICROPERFORATED BAGS ON THE STORAGE OF CHESTNUT (CASTANEA SATIVA MILL.) FOR SIX MONTHS
74 BREWERS’ SPENT GRAIN (BSG) AS A FUNCTIONAL FOOD INGREDIENT IN YOGURT PRODUCTION: THE IMPACT OF PARTICLE SIZE OF BSG IN YOGURT
75 FOOD KNOWLEDGE AND EATING HABITS IN A DEVELOPING COUNTRY: CASE OF LEBANESE CONSUMERS
76 ANTIOXIDANT PROPERTIES OF COREMA ALBUM (L.) D. DON EXTRACTS
77 NUTRITIONAL CHARACTERIZATION OF PDO CHEESES FROM THE CENTRAL REGION OF PORTUGAL
78 CARBON FOOTPRINT OF JUICE PRODUCED FROM COLD-PRESSED LOCALLY GROWN FRUIT
79 EFFECT OF CONTROLLED ATMOSPHERES AND ENVIRONMENTAL CONDITIONS IN THE PHYSICOCHEMICAL AND SENSORY CHARACTERISTICS OF SWEET CHERRY CULTIVAR SATIN
80 OPTIMIZATION OF THE BURGERS QUALITY BY THE ADDITION OF BARLEY SPENT GRAINS
81 SEA PURSLANE AS EMERGING FOOD CROP: NUTRITIONAL AND BIOLOGICAL STUDIES
82 EXTRACTS FROM MARINE ORIGIN AS FUNCTIONAL INGREDIENTS TO IMPROVE THE ANTIOXIDANT ACTIVITY OF HORSE MACKEREL (TRACHURUS TRACHURUS)
83 EFFECTS OF FREEZING, DRYING AND STORAGE PERIOD ON BIOACTIVE PROPERTIES OF ROCKET LEAVES, SPINACH AND WATERCRESS BY-PRODUCTS
84 IN VITRO GASTROINTESTINAL DIGESTION IMPACT ON THE ANTIOXIDANT ACTIVITY OF EXTRACTS PRODUCED FROM THE MICROALGAE CHLORELLA VULGARIS AND NANNOCHLOROPSIS OCEANICA
85 CHEMICAL COMPOSITION, ANTIOXIDANT CAPACITY AND PHENOLIC CONTENT OF CAROB (CERATONIA SILIQUA L.) FLOUR AS RELATED TO SEED PRESENCE AND ROASTING EFFECTS
86 BIOCHEMICAL DIVERSITY OF CARDOON FLOWERS: INFLUENCE IN THE CURD AND WHEY COMPOSITION
87 NEED AND DEVELOPMENT OF BEE POLLEN STANDARDIZATION
88 RHEOLOGICAL, TEXTURE, COLOUR AND MICROBIOLOGICAL PROPERTIES OF DOUGH AND BREAD QUALITY CHARACTERISTICS DURING STORAGE UNDER DIFFERENT PRESERVATION METHODS
89 VOLATILE PHENOLS IN AGED WINE SPIRITS: ROLE, CONTENTS AND IMPACT OF AGEING SYSTEMS
90 HOW TO ADEQUATELY DISSEMINATE INFORMATION AND INCREASE AWARENESS ABOUT CONSUMED PRODUCTS IN A DEVELOPING COUNTRY?
91 PLANT-BASED BEVERAGE: PERCEPTIONS AND BELIEFS ON PORTUGUESE POPULATION
92 EFFECT OF THERMAL TREATMENT ON ANTHOCYANINS PROFILE IN ELDERBERRY (SAMBUCUS NIGRA L.) JUICE CONCENTRATE
93 CUSTOMER KNOWLEDGE AND BEHAVIOUR ON THE USE OF FOOD REFRIGERATED DISPLAY CABINETS: A PORTUGUESE SURVEY
94 ASSESSMENT OF RAW SHEEP MILK QUALITY USED IN THE PRODUCTION OF PROTECTED DESIGNATION OF ORIGIN CHEESES IN THE CENTER REGION OF PORTUGAL
95 AN INNOVATIVE AND NUTRITIONALLY BALANCED BREAKFAST KIT DEVELOPED FOR MILLENNIALS GENERATION: SENSORY ANALYSIS BY CONSUMERS
96 THE IMPACT OF CARDOON FLOWER (CYNARA CARDUNCULUS L.) ON THE PHYSICOCHEMICAL ATTRIBUTES OF SERRA DA ESTRELA PDO CHEESE OVER TWO YEARS OF PRODUCTION
97 SERRA DA ESTRELA PORTUGUESE CHEESE: A VALUABLE PROTEIN SOURCE
98 BREAKFAST CONSUMPTION HABITS IN A SAMPLE OF PORTUGUESE ADULTS
99 EXPLORATORY STUDY ON MEAT CONSUMPTION HABITS IN A SAMPLE OF THE PORTUGUESE POPULATION
100 EVALUATION OF CONSUMERS' PERCEPTIONS, PREFERENCES AND BEHAVIORS IN RELATION TO MILK
101 KNOWLEDGE AND CONSUMPTION HABITS OF VEGETABLES AND FRUITS AMONG ADULTS: PRELIMINARY STUDY
102 CONSUMPTION PROFILE OF FRUITS, VEGETABLES, AROMATIC AND MEDICINAL PLANTS FROM ORGANIC AGRICULTURE
103 DIETARY AND BEVERAGE PATTERN IN WOMEN ENGAGE IN FAMILY FARMING IN THE CENTRE OF PORTUGAL
104 EXPLORING THE ADHERENCE TO THE MEDITERRANEAN DIET OF FAMILY FARMERS LIVING IN THE CENTER OF PORTUGAL: A PRELIMINARY STUDY
105 CONSUMPTION OF POTENTIAL IMMUNOMODULATORY FOODS BY FAMILY FARMERS LIVING IN THE CENTER OF PORTUGAL: A PRELIMINARY STUDY
106 KNOWLEDGE ABOUT SUSTAINABILITY OF EDIBLE INSECTS: AN INVESTIGATION IN A SAMPLE OF PORTUGUESE CITIZENS
107 CULTURAL PROFILE CONNECTIONS WITH FOOD BEHAVIOR - A ROMANIAN EXPERIENCE
108 EFFECT OF GRAPHENE NANOPLATELETS EXPOSURE IN LACTUCA SATIVA L.
109 GRAPHENE NANOPLATELETS AS WATER STRESS MITIGATION STRATEGY IN LACTUCA SATIVA L.
110 CHEMICAL COMPOSITION OF ARBUTUS UNEDO LINNAEUS
111 ANTI-HYPERTENSIVE ACTIVITY OF HORSE MACKEREL PULVERIZED WITH THREE DIFFERENT EXTRACTS FROM MARINE ORIGIN
112 CONNECTING QUALITY OF AGROFOOD PRODUCTS BETTER TO CONSUMERS: EASY OR DIFFICULT?
113 BY-PRODUCTS OF VEGETABLE AND AROMATIC HERBS PRODUCTION: BIOACTIVE COMPOUNDS ASSESSMENT AND ANTIOXIDANT ACTIVITY EVALUATION
114 FOOD MYTHS: EXPLORATORY STUDY ON A SAMPLE OF PORTUGUESE PEOPLE

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AGRICULTURAL SCIENCES, FOOD AND VETERINARY

CIENCIAS AGRÍCOLAS, ALIMENTOS Y VETERINARIA

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37 NUTRACEUTICS, NUTRICOSMETICS, AND MOLLECULAR COSMETICS USAGE AROUND THE WORLD
38 MARITIME PINE LAND USE ENVIRONMENTAL IMPACT EVOLUTION IN THE CONTEXT OF LIFE CYCLE ASSESSMENT
39 HEAT TREATMENT OF DUKA WOOD
40 SUSTAINABLE CONSUMPTION OF FRUITS: A LIFE CYCLE ASSESSMENT STUDY
41 CHEMICAL CHANGES IN HEAT TREATED AFRORMOSIA WOOD
42 A PRELIMINARY INVESTIGATION OF BIOCHAR DERIVED FROM NEEM CHIPS FOR THE REMOVAL OF MANCOZEB, AN EMERGING CONTAMINANT
43 FABRICATION AND PRELIMINARY INVESTIGATION OF A SIMPLE BIOGAS PLANT FOR CATTLE INDUSTRY
44 A COMPREHENSIVE EVALUATION OF OXYGEN DYNAMICS AND PADDY HYDRATION DURING CONVENTIONAL SOAKING OF PADDY PARBOILING PROCESS
45 CHEMICAL COMPOSITION OF CHERRY SEEDS PRUNUS AVIUM – PRELIMINARY STUDIES
46 ECOVALORIZATION OF SWEET CHERRY SEEDS–PRELIMINARY STUDIES
47 PLASTIC OR GLASS FOR MINERAL WATER PACKAGING: A LIFE CYCLE ASSESSMENT STUDY
48 THERMODYNAMICS AND RATE LIMITING FACTOR ANALYSIS OF METHYLENE BLUE ADSORPTION BY SELECTED BIOSERBENTS
49 CHEMICAL CHARACTERIZATION OF HAZELNUT SHELL (CORYLUS AVELLANA L.)
50 HYDROLYSIS OF HAZELNUT SHELLS IN THE BIOREFINERY CONTEXT
51 INVENTORY, PHYTOSANITARY DIAGNOSES AND BIOMECHANICAL ASSESSMENT OF VISEU URBAN TREES
52 FOOD PACKAGING: PRACTICES, KNOWLEDGE AND CONCERNS
53 GREEN CHEMISTRY: DETERMINATION OF HUMIC COMPOUNDS, HUMIC ACIDS AND FULVIC ACIDS BY LOW VOLUME COLORIMETRY
54 WILDFIRE PREVENTION USING ANIMAL GRAZING AND PRESCRIBED BURNING: 1- INITIAL SOIL CHARACTERIZATION
55 ENVIRONMENTAL IMPACT ASSESSMENT OF THE WASTE MANAGEMENT IN A COUNTERTOP PRODUCTION BASED ON LCA APPROACH
56 UNDER THE CONCEPT OF BIOREFINERY - ECO VALORISATION OF BARKS FROM ARBUTUS UNEDO L.
57 AFFIRMATION OF WOMEN IN THE RURAL COMMUNITY
58 TRENDS IN THE RED WINE MARKET IN PORTUGAL AND BRAZIL. STUDY OF THE ECONOMIC AND FINANCIAL VIABILITY OF AN ONLINE MARKETING PROJECT
59 SYSTEMATIC REVIEW OF LITERATURE: FARMING WOMEN
60 DEVELOPMENT OF CRAFT BEER WITH ARBUTUS FRUITS (ARBUTUS UNEDO L.)
61 DEVELOPMENT OF A NEW PASTA PRODUCT INCORPORATING CHESTNUT FLOUR AND BEE POLLEN
62 FROM DRIED CHESTNUTS TO HYDRO-SWEET CHESTNUTS
63 PERCEPTION ABOUT FOOD FRAUD AND LABELLING
64 PRODUCTION OF HYPER SOFT BREADS WITH CASTANEA SATIVA FLOUR FOR FAST FOOD CHAINS
65 PHYSICAL AND CHEMICAL PROPERTIES OF SOME HAZELNUT VARIETIES GROWN IN PORTUGAL
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80 OPTIMIZATION OF THE BURGERS QUALITY BY THE ADDITION OF BARLEY SPENT GRAINS
81 SEA PURSLANE AS EMERGING FOOD CROP: NUTRITIONAL AND BIOLOGICAL STUDIES
82 EXTRACTS FROM MARINE ORIGIN AS FUNCTIONAL INGREDIENTS TO IMPROVE THE ANTIOXIDANT ACTIVITY OF HORSE MACKEREL (TRACHURUS TRACHURUS)
83 EFFECTS OF FREEZING, DRYING AND STORAGE PERIOD ON BIOACTIVE PROPERTIES OF ROCKET LEAVES, SPINACH AND WATERCRESS BY-PRODUCTS
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Esteves, B., Ferreira, H., Viana, H., Cruz-Lopes, L., Ferreira, J., Domingos, I. (2021). Age influence in Paulownia tomentosa wood. *Millenium, 2*(ed espec nº8), 14-14.

AGE INFLUENCE IN PAULOWNIA TOMENTOSA WOOD

Bruno Esteves[1], Helena Ferreira[2], Hélder Viana[3], Luisa Cruz-Lopes[1], José Ferreira[1], Idalina Domingos[1]

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The insertion of new species in Portuguese forest to increase forest profitability and the resilience of rural populations has drawn some attention in the last years. Nevertheless, some caution is needed to prevent the spread of invasive species. Paulownia tomentosa is a species nicknamed miraculous tree, which has generated interest all over the world. This classification is due to the fact that this is an ultra-fast growing tree with a high rate of carbon absorption and is fire resistant. Thus, it is in this context that this work was carried out, which aimed to determine the properties of Paulownia wood growth in Portugal.

Young age Paulownia trees with ages from 1 to 5 years were obtained from a local plantation. Trees were debarked and wood samples were grounded in a Retsch SMI mill and sieved in a Retsch AS200 sieve for 20 min at a 50 rpm speed. The 40-60 mesh fraction was used for chemical analysis. The extractive content was determined by successive Soxhlet extraction with dichloromethane, ethanol and water. Lignin was determined by Klason method, while cellulose was determined as α-Cellulose following holocellulose by the chlorite method. Hemicelluloses content was determined by difference.

Results have shown that the chemical composition of Paulownia tomentosa wood changes with age. The amount of extractives in dichloromethane, ethanol and water increase with wood age. On the other hemicelluloses content decreases with age. Lignin increases from 1 to 3 years but decreases for 5 years. In relation to cellulose, it remained approximately constant.

Keywords: Tree age; Chemical composition; Paulownia tomentosa

Martinho, V. J. P. D. M. (2021). Pandemic impact on scientific production about agriculture: The main topics addressed. *Millenium, 2*(ed espec nº8), 15-15.

PANDEMIC IMPACT ON SCIENTIFIC PRODUCTION ABOUT AGRICULTURE: THE MAIN TOPICS ADDRESSED

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The Covid-19 pandemic has several impacts on human routines, changing paradigms and lifestyles. The real consequences of these drastic and abrupt changes are not yet well known, but of course they have implications for the economic, social, cultural, psychological and health dimensions of human life. The agricultural sector is no exception in this context and the impacts are real, namely in the sub-sectors most vulnerable to the context created with lockdown policies. In this way, the main objective of this research is to evaluate the responses of the scientific community to these impacts throughout the year 2020. For this purpose, a bibliometric analysis was carried out for topics related to the agricultural sector with the information obtained from the WoS (2021) and Scopus (2021) databases. Specifically, the Web of Science and Scopus metadata of the past decade have been considered to assess scientific trends in these topics over the past 10 years and the impacts of the pandemic in 2020. A systematic review was, also, carried out. The results show that there were significant changes from 2019 to 2020 in the metadata related, for example, to the most productive countries, organizations and publications. For example, journals which traditionally take less time to make a publication decision have seen their efforts compensated in terms of the number of documents published. On the other hand, there are relevant insights that can be interesting supports to fill some gaps and redirect scientific research in order to better respond to the difficulties of the main stakeholders.

Keywords: Covid-19; Scientometrics; Web of Science; Scopus

Esteves, B., Aires, P., Viana, H., Ferreira, J., Domingos, I., Cruz-Lopes, L. (2021). Pressing parameters influence in Paulownia Tomentosa particleboards density. *Millenium, 2*(ed espec nº8), 16-16.

PRESSING PARAMETERS INFLUENCE IN PAULOWNIA TOMENTOSA PARTICLEBOARDS DENSITY

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Paulownia tomentosa is a relatively recent tree in Europe that has obtained some attention due to its very fast grown that can be important for a sustainable forest economy. The main objective of this study was to evaluate the possibility of making particleboards from this wood and to study the influence of some procedural parameters on the final density of the board. Four types of fractions (0.25-0.4;0.4-1.18;1.18-1.7;1.7-2 mm) of a 3-year-old Paulownia tree were used. Each board was obtained using 40g of each fraction to form a single layer particleboard with urea-formaldehyde glue with a mass-glue ratio of 90%-10%. For this purpose, a square stainless steel mold with 10cm x 10cm and 3 weights of the same dimension were used for pressing.

The results showed that the initial wood density was around 0.42 g/cm3 and that the final densities of the boards varied between 0.39 g/cm3 and 0.89 g/cm3 depending on the pressing parameters. The size of the wood fractions has proven to be one of the most important parameters in the final density of the particleboards obtained. The bigger the fraction used (particle size) in the boards, the lower will be their density. Unlike the fraction, the higher the temperature and pressure used the higher was the final density of the boards produced. Therefore, it can be concluded that to obtain plates with lower density larger particles, lower temperatures and pressing pressures should be used,

Keywords: Density; Paulownia tomentosa; Particleboards; Pressing parameters

Rathnapriya, U., Tharmarajah, T., Nadarajah, K. (2021). A simple automated micro-irrigation package for home level cultivation of eggplant. *Millenium, 2*(ed espec nº8), 17-17.

A SIMPLE AUTOMATED MICRO-IRRIGATION PACKAGE FOR HOME LEVEL CULTIVATION OF EGGPLANT

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Water is a limited resource worldwide. Agriculture consumes significant amount of water to get crop yield. However, a considerable portion of applied water is wasted due to improper practices. Excessive application of water to agricultural lands applied with artificial fertilizers pollutes water resources critically. Hence, was made to develop an automated drip irrigation package for growing eggplants the at home level with precious application of water and fertilizer. An experiment was set with three treatments T1 (fully saturated soil with recommended dossage of fertilizer and water), T2 (10% reduction of water and fertilizer) and T¬3 (20% reduction of water and fertilizer). The entire irrigation system was automated by Arduino programming. Crop parameters, stem diameter, height of plant, number of leaves, leaf area, number of flowers, shoot to root dry mass ratio and number of pods were measured along with soil moisture dynamics. Resulted with this study revealed that the 10% reduction in feterlizer and water application did not affect crop yield and soil moisture compared to standard level application of water and fertilizer. Hence, this innovative outcome suggests that the reduction in water and fertilizer application minimizes the cost of production and environmental pollution. As the world turns into organic agriculture due to health issues caused by excessive application of agro-chemicals, outcomes of this comprehensive study facilitate home level eggplant cultivation in an eco-friendly and healthy manner.

Keywords: Automation; Eggplant; Fertilizer; Home garden; Micro-irrigation

Aires, P., Cruz-Lopes, L., Ferreira, J., Viana, H., Domingos, I., Esteves, B. (2021). Strength variation with glue percentage in Paulownia Tomentosa particleboards. *Millenium, 2*(ed espec nº8), 18-18.

STRENGTH VARIATION WITH GLUE PERCENTAGE IN PAULOWNIA TOMENTOSA PARTICLEBOARDS

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This work intended to promote the valorization of Paulownia tomentosa wood growth in Portugal. The main objective was to evaluate the bending strength and stiffness of particleboards made with this wood. Since this tree is a very fast growing tree, one of the possible valorizations is particleboard production of very young age trees which would allow a sustainable forest management. A 3-years-old Paulownia tree from a Portuguese plantation was used for the tests. Two different wood fractions (0.25-0.40 and 4-1.18 mm) and three percentages of urea-formaldehyde glue (8%, 10% and 12%) were used. For each board 40g of wood were used to make a single layer particleboard bonded with UF glue. The boards were made in a Carver press using a square stainless steel mold with 10cm x 10cm. The pressing temperature was 180ºC and 4 US tons of force exerted during 6 minutes of pressing time Bending strength and stiffness were determined in a universal test machine Servosis I – 405/5 according to EN 310 standard with some modifications. Tests were made in triplicate and averages and standard deviation were determined. Bending strength was calculated by fm=3Fmax*l/(2*b*t) where Fmax is the maximum force, l is the span (80 mm), b the width and t the thickness and MOE=l3*slope/(4bt3). Preliminary results have shown that bending strength varied between 3.2 MPa and 34.2 MPa while bending stiffness ranged between 208 Mpa and 5205 MPa. Both bending strength and stiffness increased with the percentage of glue for the studied particle fractions.

Keywords: Bending stiffness; Bending strength; Paulownia tomentosa; Particleboards

Guiné, R., Mesquita, S., Costa, D., Coelho, C., Oliveira, J., Correia, P., Correia, H. E., Costa, C. A. (2021). Characterization of the beekeeping activity in six European countries. *Millenium, 2*(ed espec nº8), 19-19.

CHARACTERIZATION OF THE BEEKEEPING ACTIVITY IN SIX EUROPEAN COUNTRIES

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Beekeeping is an important activity, playing a central ecological role related with pollination and seed production, thus contributing for the diversification of agricultural production and the balance of ecosystems. As an economic activity, emerges as an important opportunity within family farming, generating an extra income and contributing to the reduction of unemployment. Thus, in view of the importance of beekeepers in the European Union, especially non-professional and family beekeepers, a survey was carried out to characterize the profile and training of the beekeepers. This survey was applied to beekeepers from seven countries (Portugal, Spain, Italy, Croatia, Estonia, Norway, and Finland), as part of the project beeB (Ref. 2019-1-PT01-KA202-060782). The data was collected through a questionnaire applied by personal interview. The data was analyzed by means of frequencies of responses. The sample consisted of 313 responses, with a higher incidence of male responses. About 61% of participants said they had completed higher education, and only a small percentage a small percentage indicated a basic education level (3%). Only 15% of respondents mentioned beekeeping as their main source of income, apart from Italy (42%).

Most of the beekeepers have up to 100 colonies, and honey production remains the most relevant product, followed by wax. In most cases, and similarly in all countries, beekeepers have the help of family members. However, there are differences with regards the income coming from beekeeping activity, being a hobby for most participants in Portugal, Spain and Norway, while being essentially an additional source of income in Estonia, Croatia and Finland. The only country where a majority of the participants assume beekeeping as full time professionals is Italy.

Keywords: Beekeeper; Bee products; Beekeeping sector; Country differences

Quinta-Nova. L., Ferreira, D., Almeida, A. (2021). Present and future land suitability analysis for emerging fruit crops using spatial multicriteria decision systems. *Millenium, 2*(ed espec nº8), 20-20.

PRESENT AND FUTURE LAND SUITABILITY ANALYSIS FOR EMERGING FRUIT CROPS USING SPATIAL MULTICRITERIA DECISION SYSTEMS

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In recent years there has been an increase of investment in so called emerging fruit crops. It is agreed that the choice of uses and practices best suited to soil and climate conditions promotes the sustainable use of rural areas, with positive economic impacts.

The objective of this study is to determine the suitability of emerging fruit crops based on the analysis of the limiting factors. The suitability was examined for the present time and in the face of two future emission scenarios (RCP 4.5 and 8.5). For this purpose, the biophysical criteria determining the cultivation of pistachio tree, strawberry tree and almond tree were processed using ArcGIS 10.8.

The Analytical Hierarchy Process (AHP) was used to determine suitability for the crops. A pairwise comparison between environmental criteria (temperature, rainfall, chilling hours, crop heat units, relative humidity, topography, and soil proprieties) was performed to calculate the weights of these criteria. As a result of the AHP suitability maps for each crop in the present conditions, for the RCP 4.5 and the RCP 8.5 scenarios were produced.

In the present conditions about 16.4% of the study area is classified as highly suitable for almond tree, 15.8% to strawberry tree, and 15.9% to pistachio tree. For the future scenarios, the area with high suitability will increase for almond tree and pistachio tree and will decrease for strawberry tree. It is the essential to be aware of the suitability and resilience of new crops to meet the need to adapt to climate change.

Keywords: Fruit production; Land suitability; Climate change; AHP; GIS

Costa, D. V. T. A., Coelho, C., Viana, H., Lavado, C., Salgueiro, J., Costa, C. A. (2021). What are the reasons that influence young people life choices towards agriculture and the inner territories. An approach based on focus groups. *Millenium, 2*(ed espec nº8), 21-21.

WHAT ARE THE REASONS THAT INFLUENCE YOUNG PEOPLE LIFE CHOICES TOWARDS AGRICULTURE AND THE INNER TERRITORIES. AN APPROACH BASED ON FOCUS GROUPS

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The inner territories in the Portuguese Centre Region have seen a significant decrease in the resident population, with values that reach 75% in relation to 1960, resulting in the consequent abandonment of agricultural activity. The result has been the aging of the population and the occupation of agricultural areas by fast-growing forest species or disorderly bush/ forest that potentiate the threat caused by forest fires, as well as the loss of biodiversity and the increase of associated environmental imbalances. Within the scope of the project Mitigation of depopulation through the revitalization of agro-silvo-pastoral systems in the interior of Portugal, the methodology of Focus Groups was applied to characterize the young people that remains in these territories and understand the reasons for the abandonment of the territories and agriculture. Three focus groups (Gouveia, Fundão and Vouzela) were organized, with a total of 49 participants aged between 23 and 77 years old.

The reasons for the abandonment of the territories identified are: economic (32%), social (29%), technical (20%), political (17%) and psychological (2%). Young people who still remains in these territories, mainly come from the cities (43%), for whom agriculture is a family tradition (24%), with training in the agricultural sector (18%), for whom agriculture appears as a secondary activity (10%), or without other job options (5%). The causes identified as promoting the abandonment of agricultural activity in these territories were: technical (43%), economic (29%), social (21%) and political (7%).

Keywords: Depopulation of territories; Agro-silvo-pastoral systems; Rural abandonment

Dias, R., Santos, C., Correia, M. C., Correia, H. E., Costa, D. T. A., Dias, J., Rocha, S., Costa, C. A. (2021). Bio-districts or Eco-regions: A portuguese case study. *Millenium, 2*(ed espec nº8), 22-22.

BIO-DISTRICTS OR ECO-REGIONS: A PORTUGUESE CASE STUDY

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Rural areas have faced numerous challenges over the years, including desertification, loss of employment and abandonment of agricultural activity, leading to the emergence of several initiatives aimed at revitalising the territories such as the Bio-districts or Eco-regions, with a focus on the territorial development where they are inserted, the promotion of a sustainable territory and the encouragement of ecological agricultural.

In Portugal, the S. Pedro do Sul Eco-region emerged as a regional development initiative, promoting organic products, in articulation with other local actors. This initiatives are particularly adjusted to a territory with an agro-ecological vocation, where small and medium farms predominate, based on economic and social models that meet the current societal problems, such as the need of adequate food and nutrition, the conservation of nature and natural resources, the maintenance of the landscape and its populations.

Three focus groups were held in S. Pedro do Sul Eco-region, Left Bank of the Guadiana Eco-region, and Intermunicipal Community of Alto Tâmega Eco-region, in 2020, to discuss possible guidelines for the Eco-regions. Participants included farmers and its associations, consumers, schools, tourism related stakeholders, local authorities and governmental technicians. We have used a participative "Word café" methodology and the results were submitted to a categorical content analysis.

Through their analysis, it was unanimous that farmers are the basis of these dynamics, and that technical knowledge is required for its success. Tourism, restaurants, social organizations and other local actors are important, as they consume local organic produce. The governance models should include famers but with the support of the local administrations. The recognition of a Bio-region should be informal, between peers and the minimum parameters for its recognition should include the existence of organic agriculture and mechanisms to ensure the local produce certification and commercialization.

Keywords: Eco-region; Rural development; Organic farming; Focal groups

Cassoni, A. C., Costa, P., Vasconcelos, M., Pintado, M. (2021). Optimization of lignin extraction from grape stalks and evaluation of antioxidant activity. *Millenium, 2*(ed espec nº8), 23-23.

OPTIMIZATION OF LIGNIN EXTRACTION FROM GRAPE STALKS AND EVALUATION OF ANTIOXIDANT ACTIVITY

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The agro-food industry produces large amounts of wastes, many of which are lignocellulosic residues. These residues have lignin in its composition, an underrated biopolymer with high potential for valorization. One of the opportunities lies in the antioxidant capacity of lignin that can be further applied in the food industry, namely on packaging. Hence, this work aimed at optimizing the extraction of lignin from grape stalks and evaluating its antioxidant capacity.

To achieve optimized extraction parameters, a Box–Behnken design was conducted, using the alkaline method. Four varying factors were tested: NaOH concentration, liquid-solid ratio, temperature reaction and time (total of 27 experiments performed in duplicate). The optimal extraction parameters were selected based on lignin yield and its antioxidant capacity (ABTS and DPPH methods). The predicted values were further validated by experimental data.

The optimum extraction parameters were defined as follows: NaOH 6% (w/v), liquid-solid ratio of 10, 80 °C and 1 hour. The obtained lignin yield was 48.6%. These extraction conditions yielded a lignin-rich extract with high antioxidant capacity: 466.2 µM Trolox equivalent/mg of lignin for ABTS and 407.1 µM Trolox equivalent/mg of lignin for DPPH.

With this work, it was possible to define an alkaline extraction protocol that allows the recovery of a lignin-rich extract with antioxidant potential from a relevant agro-food residue. Thus, grape stalks can be a valuable source of lignin with high antioxidant capacity to be used in different applications.

Keywords: Agro-food; Antioxidant; Extraction; Lignin; Optimization

Viana, H., Marques, F., Pinto, A., Costa, C. A., Costa, D. (2021). Chestnut culture – Preliminary results in a demonstration site in Penela da Beira. *Millenium, 2*(ed espec nº8), 24-24.

CHESTNUT CULTURE – PRELIMINARY RESULTS IN A DEMONSTRATION SITE IN PENELA DA BEIRA

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The chestnut farming plays a multifunctional role in Mediterranean Ecosystems constituting a fundamental element of sustainable development of rural populations of north and center of Portugal. The chestnut stands are facing several threats, as consequence of climate change, and erroneous cultural practices. Several pests and diseases are causing the death of many trees, with consequences in the production of the nut.

The Climcast Project aims to contribute to the growth of the sector, by increasing production area and providing a set of information for political decision support for producers. One of the main tasks is to evaluate the success of different cultivars, study the vegetation under canopy by analyzing the biomass (Mg.ha-1) and calculating several metrics and biodiversity indices.

The preliminary results shown that the varieties Cota, Longal and Martaínha have the highest success rate (100%) with the clonal graft holder COLUTAD. The main families representing the vegetation cover are Poaceae (87,8%), Asteraceae (7%) and Polygonaceae (4,2%). the Holcus lanatus L. is the dominant species. The calculated biodiversity indices indicates a low species richness, low equity and low diversity.

The continuity of measurements and monitoring of this demonstration chestnut stand will allow to understand the adaption of this culture under the climate changes and creating guidelines for best agricultural pracities for the future of this culture.

Keywords: Castanea sativa Mill.; CLIMCAST, COLUTAD; Cultivars; Pests and diseases; Vegetation cover

Horta, C., Batista, M., Roque, N. (2021). Impact of outdoor pig production on soil properties: P sorption and risk of eutrophication of waterbodies. *Millenium, 2*(ed espec nº8), 25-25.

IMPACT OF OUTDOOR PIG PRODUCTION ON SOIL PROPERTIES: P SORPTION AND RISK OF EUTROPHICATION OF WATERBODIES

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The increase of soil available phosphorus (P) could be due to (i) the use of P fertilisers at higher rates than those required by crops in agricultural soils, and to (ii) the inputs of livestock production provided by the addition of feed and animals excreta to soils. In this latter case, there is also an increase of the soil organic matter (SOM). Several researchers reported the effect of the OM in preventing P sorption in agricultural soils and consequently the increase of P losses from soils to waterbodies by drainage and runoff waters.

This work aimed at evaluating the effect of outdoor pig production on P sorption in soils enriched with OM. The experiment was done for two years, at an experimental area of 2.8 ha, at the Polytechnic Institute of Castelo Branco. Soil samples were taken at 0.20 m depth and a P sorption experiment was carried out using the method of Fox and Kamprath (1970). The sorption data were fitted to the Langmuir isotherm.

The results showed that from the beginning of the experiment till the end the level of soil organic matter increased from 1.8 (± 0.21) to 4.1 % (± 0.15) and the maximum soil P sorption capacity decreased from Qmax=147 (± 14) to Qmax=128 (± 3) mg kg^{-1}. The linear model Qmax= -37.168SOM+282.19 R^2=0.73 ($p<0.05$) highlight the effect of SOM on the decrease of P sorption and the need of good management practices to prevent the eutrophication of waterbodies from livestock production.

Keywords: Eutrophication; Phosphorus sorption; Soil Olsen P; Soil organic matter

Ribeiro, B., Costa, D. V. T. A., Almeida, A. R., Lima, M. J. R., Costa, C. A., Teixeira-Lemos, E. (2021). The cowpea in the Lafões' region. Local varieties characterization and uses. *Millenium, 2*(ed espec nº8), 26-26.

THE COWPEA IN THE LAFÕES' REGION. LOCAL VARIETIES CHARACTERIZATION AND USES

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In traditional Mediterranean agricultural systems, cowpeas are one of the legumes grown by farmers because of their nutritional value, their ability to fix nitrogen and their tolerance to drought. This study intended to characterize botanically and phenologically seven local varieties of cowpeas ('branco', 'miudo1', 'miudo2', 'vagem', 'preto', 'normal' and 'olho preto'), obtained from farmers in the Bio-region of São Pedro do Sul.

A trial was installed in 2020, at Quinta da Comenda, São Pedro do Sul. From seeding to harvesting, physical and phenological characterization of 10 plants per variety was performed, using the descriptors for cowpea proposed by Biodiversity International (2007). Farmers were interviewed in relation to cowpeas commercialization and uses.

The germination rate was in average 40%. The phenological evolution was similar among varieties. The vegetative phase had an average duration of 42 days. The cowpeas 'vagem' and 'preto' had a higher average weight (2.23 g and 2.35 g respectively) and number of seeds (9.9 and 10.35 seeds respectively).

Cowpeas are mostly used for own consumption (60%) and sold in traditional markets (24%). About 5% is kept for the next year and 10% is exchanged with neighbours and relatives.

Moreover, cowpeas are included in the diet once or twice a month. Most popular dishes are 'cowpea and tuna salad'; 'cowpea and codfish salad'; 'soup' and 'migas' (cabbages, bread and cowpeas in accordance with traditional Mediterranean diet).

Keywords: Vigna unguiculata L. Walp; Pulses; Morphology; Local varieties

Dias, C., Ribeiro, T., Rodrigues, A. R., Ferrante, A., Vasconcelos, M. W., Pintado, M. (2021). Effect of Naphthaleneacetic acid on restoring 'Rocha' pear ripening under 1-MCP evergreen effect. *Millenium, 2*(ed espec nº8), 27-27.

EFFECT OF NAPHTHALENEACETIC ACID ON RESTORING 'ROCHA' PEAR RIPENING UNDER 1-MCP EVERGREEN EFFECT

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'Rocha' pear (Pyrus communis L. cv. Rocha), a DOP cultivar from the west region of Portugal, is quite appreciated worldwide due to its exceptional organoleptic quality. Because of its high exportation, preservation of this cultivar during long-term cold storage is of utmost importance, but remains a challenge for suppliers, especially after diphenylamine exclusion from the agricultural sector.

Since then, postharvest disorders have been prevented through the use of 1-methylcyclopropene (1-MCP). Nevertheless, this compound disrupts the normal ripening of fruit, affecting its eating quality and producer's sustainability. Consequently, there is the need for developing innovative solutions to recover 'Rocha' pear ripening capacity after 1-MCP application. Several strategies have been investigated to avoid the persistent blockage of ripening after 1-MCP as, for example, the application exogenous ethylene, the increase of temperature, but demand high energy consumption.

This study was designed to test the restorage of ripening via immersion of 1-MCP treated fruits in an auxin- 1-Naphthaleneacetic acid (1-NAA) solution. Fruit ripening as judged by ethylene evolution and respiration associated with color changes and softening, was accelerated by 1-NAA treatment compared to control (pear only treated with 1-MCP). 1-NAA treatment effect was evident through the firmness loss of the fruit (ca. 60%) and increased internal ethylene production (ca. 50%). Also, exogenous 1-NAA treatment increased 1-aminocyclopropane carboxylic acid and ACC oxidase activity corroborating the physiological results obtained.

The results provide information regarding how 1-MCP blockage may be circumvented, thus opening avenues for consistent ripening of 'Rocha' pear ensuring fruit quality and reducing postharvest losses.

Keywords: 1-Methycyclopropene; 'ever-green' effect; Ripening recovery; Long-term storage; Naphthaleneacetic acid

Costa, C. A., Pereira, A. A., Gomes, D., Magalhães, C., Jesus, M., Rosa, R., Abreu, A., Chaves, C., Homem, D., Coutinho, E., Jóia, H., Martins, S., Neves, T., Farstad, M., Gustavsson, M., Lisboa, M. (2021). Gender equality and empowerment in women farmers in the inner Portuguese territories: A qualitative study. *Millenium, 2*(ed espec nº8), 28-28.

GENDER EQUALITY AND EMPOWERMENT IN WOMEN FARMERS IN THE INNER PORTUGUESE TERRITORIES: A QUALITATIVE STUDY

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The current body of research outlines the enormous importance of the role of women in rural areas and in family farming. However, these women experience strong vulnerabilities, namely in terms of gender inequalities and economic dependence, accentuated by their weak representation in local associative structures and in decision-making places. This study in part of an international project that aims to promote gender equality, empowerment and associativism among women farmers in interior territories.

Fourteen women farmers participated in two focus groups – Sabugal and S. Pedro - the average age is 50,5 years and the average dimension of the farms is 63,2 ha. The type of products these women grow are livestock, vegetables, blueberries, and wine. The discussion was regarding the role that family women farmers in these territories play in the organization of the farm and the family, as well as their training and empowerment needs that will help to design a subsequent intervention that aims to reduce gender inequalities, economic dependence, and increase the representativeness of women farmers in the society. The discussions were tape recorded, and the themes and content are presently being coded and analyzed. The preliminary analyses show that strategies focused on associativism, product valorization, marketing and commercialization, bureaucracy easiness, land structure, technical support, valorization of the women farmers and family farming traditions, might contribute to empower of these women.

Keywords: Family farming; Associativism; Women farmers value

Rodrigues, A. M., Paulo, L., Frazão, D., Beato, H., Resende, M., Delgado, F. (2021). Chemical composition and fatty acid profile of Cistus Ladanifer L. capsules for animal feed. *Millenium, 2*(ed espec nº8), 29-29.

CHEMICAL COMPOSITION AND FATTY ACID PROFILE OF CISTUS LADANIFER L. CAPSULES FOR ANIMAL FEED

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The rockrose Cistus ladanifer L. is a shrub widespread in the western Mediterranean basin, very common in Portugal, especially in the southern regions of Beira Baixa, Alentejo and the Algarve. This shrub is related to the "Montado", the Portuguese name for a cork and/or holm oak forests, that is one of the richest ecosystems in the world. To valorize this widespread resource, C. ladanifer seeds can be separated and used for human consumption and the remaining capsules material may be used for animal feed. The goal of this work was to evaluate the chemical composition and fatty acids profile of C. ladanifer capsules. Fruits were collected in Beira Baixa Region during June/July, August, September/October 2020 and the morphological fractions (seed and capsule) were separated. Capsule material from different seasons rendered 70-80% of the fruit weight and showed no distinct DM, CP, EE, ash, NNE, CF, hemicellulose, fatty acids C16:0, C16:1, C18:1, C18:2, C18:3, total saturated fatty acids, total monounsaturated fatty acids and total polyunsaturated fatty acids composition ($p>0.05$). However, C18:0 was higher in June/July, NDF and ADF was higher in September/October and ADL was lower in June/July ($p\leq0.05$). The relationship of C. ladanifer with the "Montado" agrosilvopastoral system, and the chemical composition and fatty acid profile of the capsules similar to the whole acorn, additionally better than cereal straw, allow us to consider the hypothesis of using this by-product in the formulation of concentrate to be used in the extensive production systems of ruminants and pig native breeds.

Keywords: Rockrose; Chemical seasonal variation; "Montado"; Animal nutrition; Native beeds.

Acknowledgments: CERNAS – FCT project UIDB/00681/2020 and CULTIVAR - Network for sustainable development and innovation in the agri-food sector CENTRO-01-0145-FEDER-000020.

Paulo, L., Carmo, V., Beato, H., Resende, M., Rodrigues, A. M. (2021). Edible part nutritional composition of wild European catfish from Tagus River basin - Portugal. *Millenium, 2*(ed espec nº8), 30-30.

EDIBLE PART NUTRITIONAL COMPOSITION OF WILD EUROPEAN CATFISH FROM TAGUS RIVER BASIN - PORTUGAL

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The European catfish (Silurus glanis Linnaeus, 1758) is the largest-bodied European freshwater fish. In Central and Eastern Europe, it has been reared in extensive ponds in association with carps for more than 100 years. The European catfish is an invasive fish species in Portugal. More and more fish of this species are currently being caught in the Tagus River and the risks to native species are through disease and parasite transmission, competition for benthic habitats and predation. The consumption of wild freshwater fish is traditional in the southern regions of Beira Baixa and Alentejo where there are some Chefs interested in cooking and increasing the consumption of wild European catfish from the Tagus River basin. Before it is necessary to known the edible part chemical composition of this fish. The goal of this work was to evaluate the nutritional composition, minerals, fatty acids profile and heavy metals concentration of S. glanis (n=7) from Tagus River basin caught in April 2021. The edible part chemical composition was: moisture 80.2%, ash 0.99%, protein 17.5%, fat 0.9% (0.2% saturated, 0.4% monounsaturated and 0.2% polyunsaturated fatty acids) energy 79.5 kcal.100g-1, Na 49.5 mg.100g-1, P 177.2 mg.100g-1, Mg 21.1 mg.100g-1, Ca 3.5 mg.100g-1, K 348.9 mg.100g-1, Cu <LOQ, Fe 0.2 mg.100g-1, Mn 0.01 mg.100g-1, Cd <LOQ, Cr <LOQ and Pb <LOQ. European catfish is a low fat fish with high monounsaturated fatty acid. Heavy metal and other metals concentrations were below the maximum permissible for a safety utilization for human consumption.

Keywords: Silurus glanis; Predatory fish; Fatty acids profile; Minerals; Heavy metals

Acknowledgments: CERNAS – FCT project UIDB/00681/2020.

Rodrigues, A. M., Veloso, A., Beato, H., Resende, M., Paulo, L. (2021). Fillet chemical composition and fatty acid profiles of largemouth bass feed redworm or concentrate or natural feed. *Millenium, 2*(ed espec nº8), 31-31.

FILLET CHEMICAL COMPOSITION AND FATTY ACID PROFILES OF LARGEMOUTH BASS FEED REDWORM OR CONCENTRATE OR NATURAL FEED

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Largemouth bass (Micropterus salmoides Lacépède, 1802) (LB) is one of the most popular freshwater sports fish in Portugal. It is very important in regional cuisine, especially in the countryside (Beira Baixa, Ribatejo and Alentejo regions). There is some interest in LB aquaculture production. Redworm (Eisenia fetida Savigny, 1826) is a very good source of protein for animal feed. The aim of this work was to evaluate the influence of 3 types of feed (natural feed, redworm and, concentrate) on largemouth filet protein (Kjeldahl), fat (Soxtec), energy (Regulation (EU) n.º1169/2011) and fatty acid profile (GC-FID). Sixteen wild LB were caught in a small irrigation dam (39º49'27.89''N; 07º26'57.92''W) and were placed in 2 tanks for 212 days (October to May) after 3 weeks of acclimatization period. Eight LB were fed with fresh redworm (LBG2) and 8 LB were fed with concentrate (LBG3). In May of the following year 8 LB from the same irrigation dam, with the same age (scale evaluation), and fed with natural feed (LBG1) were caught. Ice-slurry immersion was used to ensure the LB euthanasia. All LB were fileted at the same day. Comparing with LBG1 the following results were obtained: LBG2 fillet had less ($p \leq 0.05$) fat, energy, total polyunsaturated fatty acids, C18:3n-3, DHA/EPA and n-3/n-6, and had more ($p \leq 0.05$) C18:1n-9 and C18:1n-9/n-3; LBG3 fillet had more ($p \leq 0.05$) fat, energy, C20:1n-9, C22:1n-9, C20:3n-3, EPA, DPA, DHA, total polyunsaturated fatty acids, total long-chain-PUFAs and DHA/EPA. We conclude that the largemouth bass diet influences the fillets nutritional composition.

Keywords: Micropterus salmoides; Eisenia fetida; Nutritional composition; DHA; EPA

Acknowledgments: CERNAS – FCT project UIDB/00681/2020.

Lemos, C., Brito, M. (2021). Evolution of ovine farms in Central Region of Portugal: analysis of 40 years of agricultural census. *Millenium, 2*(ed espec nº8), 32-32.

EVOLUTION OF OVINE FARMS IN CENTRAL REGION OF PORTUGAL: ANALYSIS OF 40 YEARS OF AGRICULTURAL CENSUS

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With approximately 28199km2, the Central Region of Portugal reflects an asymmetric territorial development, historically correlated with ovine industry for dairy, wool and meat production. The study analyses the importance and evolution of number of ovine farms in the region, by location, number of ovine and pasture area in years 1989, 1999, 2009 and 2019, as well as the amount of milk collected in 2009 and 2019.

INE data, CAOP2020 and Pan-European High Resolution Layers on Grassland were used. Descriptive and inferential analysis was performed using t-tests, ANOVA, Kruskal-Wallis and correlation (α=5%;SPSSv26). ArcGIS(v10.8) was used as georeferencing tool.

The results suggest that over the past 40 years, in all NUTS_III, there was a significant decrease in number of farms, a small reduction in number of ovine, but a significant increase in permanent pastures. Despite a significant decrease in number of farms, there has been a greater concentration of ovine, an increase in sheep's milk collected and pasture areas, more expressive in 'Beira Baixa' and 'Beiras and Serra da Estrela'. There was a very strong positive correlation between the number of ovine with the pasture area and the sheep's milk collected.

Favourable characteristics, such as sheep precocious puberty, short gestation and rapid growth rate, make ovine production one of the most successful livestock activity. Sustainable policies and strategies for ovine production should be encouraged for economic growth and efficient land-use planning. The trend towards the abandonment of rural areas can be reversed optimizing endogenous productions of high quality and great economic potential.

Keywords: Ovine; Sheep's milk; Sheep's milk cheese; Pastures; Central Region of Portugal

Oliveira, J., Coelho, C., Perdigão, A., Vala, H., Pinto, A., Nóbrega, C., Garcia, C., Esteves, F., Santos, C., Wessel, D. (2021). Use of savory (Satureja montana) byproduct as a phytobiotic supplementation in broiler production improvement. *Millenium, 2*(ed espec nº8), 33-33.

USE OF SAVORY (SATUREJA MONTANA) BYPRODUCT AS A PHYTOBIOTIC SUPPLEMENTATION IN BROILER PRODUCTION IMPROVEMENT

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Savory (Satureja montana) is an aromatic plant widely used in food industry. Only leaves are commercialized, generating a large amount of stems as byproduct with reduced economic value.

This study was conducted to assess the effect of savory by-product as supplementation of broilers' diets on growth performance, feed intake and carcass yield.

One hundred and ninety-two Ross 308 one-day old chicks were randomly distributed into sixteen pens, with twelve animals each. All animals were fed ad libitum with commercial feedstuffs. The control [C] and treatments (with savory by-product supplementation: 10 [S1], 20 [S2] and 40 [S4] g/kg) were assigned by pens according to a 4x4 latin square design. Weekly controls of individual body weights and feed intake were performed. At the end of the trial (35 days), 2 animals from each pen were slaughtered, plucked and eviscerated, for a total of 8 animals per treatment.

The outcomes were final body weight (FBW), average daily feed intake (ADFI), average daily weight gain (ADWG), feed conversion ratio (FCR), refrigerated carcass weight (RCW) and refrigerated carcass yield (RCY). Although all variables did not differ significantly between treatments, supplementation with 10 g savory/kg diet allows for a slight increase in the values obtained (more 35.1 g in FBW and 10% less in FCR). The lower FCR is a combined effect of lower ADFI and higher ADWG.

Spite the slightly differences in values, the scale broiler production system may provide a potential economic advantage by incorporating savory by-product into diets at lower levels.

Keywords: Savory; By-products; Supplementation; Broiler; Growth; Feed intake; Carcass

Barracosa, P., Coutinho, R., Ausquia, R., Barracosa, M., Matias, J., Oliveira, J. (2021). Chemical characteristics of raw ewe´s milk from Serra da Estrela producers along the flock lactation stage. *Millenium, 2*(ed espec nº8), 34-34.

CHEMICAL CHARACTERISTICS OF RAW EWE´S MILK FROM SERRA DA ESTRELA PRODUCERS ALONG THE FLOCK LACTATION STAGE

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Serra da Estrela (SE) cheese is a Portuguese traditional Protected Designation of Origin (PDO) produced with raw ewe´s milk from SE breed. Casa da Insua is one of the certified cheese producers in PDO SE region. From November till May bulk milk were evaluated and characterized for dry matter (%), fat (%) and protein (%). Milk characteristics were assessed using a FT-NIR spectrometer. To analyse the influence of milk producer and season production, the data was subject to analysis of variance (ANOVA). Differences of means were performed with Tukey´s post hoc tests. IBM SPSS v26 Statistics software was used with a level of significance of 0.05. The milk composition was dry matter: 18.97±1.66% (15.98-21.05%); fat: 39.95±3.21% (38.02-45.73%); and protein: 30.30±1.35% (28.90-32.06%). Along the flock lactation stage were observed significant differences in milk composition. Dry matter showed the lowest content in November (15.98%) increasing till January (21.05%) with a slight reduction till the end of May (~19.00%). The highest content for fat was obtained in November (45.73%) with a reduction till January (36.33%) and recovered till the final of May (43.74%). Protein content in November was 29.76% with a maximum content in March (32.00%) and a reduction till the final of May (30.31%). The knowledge about chemical composition during the milking season, namely fat and protein contents is determinant for cheese quality and seems to be influenced by ewe´s feed (natural pasture or commercial feed) and the flock lactation stage.

Keywords: Serra da Estrela ewes; Chemical parameters; FT-NIR; Raw milk

Acknowledgments: The authors wish to thank Programa de Desenvolvimento Rural 2014-2020 (PDR2020) under Portugal 2020 and through Fundo Europeu Agrícola de Desenvolvimento Rural (FEADER) for the financial support iCheese Project (PDR2020-101-031002).

Oliveira, J., Coelho, C., Wessel, D., Vala, H., Garcia, C., Coutinho, R., Barracosa, P. (2021). Influence of cardoon (Cynara cardunculus L.) supplementation in growth, feed ingestion and economic efficiency in growing rabbits. *Millenium, 2*(ed espec nº8), 35-35.

INFLUENCE OF CARDOON (CYNARA CARDUNCULUS L.) SUPPLEMENTATION IN GROWTH, FEED INGESTION AND ECONOMIC EFFICIENCY IN GROWING RABBITS

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Cynara cardunculus L. biomass for animal feeding is a potential strategy for economic valuation of the whole plant and reduction of biowaste. Cardoon can be a source of soluble fiber (e.g., inulin) and supply nutraceutical compounds (e.g., polyphenols).

The study aimed the incorporation of fresh cardoon leaves in the diet of fattening rabbits associated with feedstuff to evaluate the putative enhancement in productive and economic efficiency. Twenty male rabbits of the Hyplus strain individually housed, randomly distributed into two groups of 10 animals, one with ad libitum fattening feedstuff (Control) and the other with the same food strategy plus 250 g of cardoon per day (Treatment). The trial were from weaning until 76 days of age. The rabbits were weekly weighed and monitored for feedstuff consumption. At the end of the trial, 3 animals per group were slaughtered.

For productive and economic efficiency determination, live body weight (LBW), average daily feed intake (ADFI), average daily gain (ADG), feed conversion ratio (FCR), refrigerated carcass yield (RCY) and net return (€/kg LBW) were evaluated [1].

Spite the final LBW, ADG and RCY present greater values for control group ($p \geq 0.05$), the differences ($p < 0.05$) of ADFI and FCR between treatments indicates superior utilization of feedstuff by kg LBW with cardoon. The net return presents no significative differences between treatments, but the animals supplemented with cardoon show in average more 5 eurocents/kg LBW.

The results reveal a preliminary but promising use of cardoon leaves as a feed supplement in growing rabbits' industry.

Keywords: Rabbit production; Feed consumption; Cardoon; Economic efficiency

[1] Abd El-Aziz, A. H., El-Kasrawy, N. I., Abd El-Hack, M. E., Kamel, S. Z., Mahrous, U. E., El-Deeb, E. M., Atta, M. S., Amer, M. S., Naiel, M. A. E., Khafaga, A. F., Metwally, A. E., & Abo Ghanima, M. M. (2020). Growth, immunity, relative gene expression, carcass traits and economic efficiency of two rabbit breeds fed prebiotic supplemented diets. Animal Biotechnology. https://doi.org/10.1080/10495398.2020.1800485.

Mesquita, S., Leitão, J., Oliveira, A., Coelho, C., Costa, C. A. (2021). Efficiency and impact on biodiversity in the usage of electric harps for control of Vespa velutina. *Millenium, 2*(ed espec nº8), 36-36.

EFFICIENCY AND IMPACT ON BIODIVERSITY IN THE USAGE OF ELECTRIC HARPS FOR CONTROL OF VESPA VELUTINA

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In addition to the bee's health problems that put their colony at risk (apis mellifera), the Vespa velutina appeared as its great predator. In Europe, it had its first record in France in 2004, having spread to other countries, with Portugal's first case being registered in 2011.

Being a large wasp, with an annual life cycle, its diet is mainly based on insect protein, preferably bees, so it poses an important threat to Apis mellifera, between the months of July and October, decimating almost all their hives.

It is important to capture the founder wasps in early spring to prevent the formation of new nests. Despite this successful method of combat, the placement of traps in apiaries reduces the number of bees captured by this wasp, when the predation of the velutina Wasp is strongest in the hives, between July and October.

In 2 apiaries at different locations, 2 anti-bird tunnels with a 10x10cm mesh, were placed at each end 1 electric harp with a tray at the bottom with water and detergent. Every 15 days, the materials were removed and the presence of Vespa velutina, apis mellifera and other captured animals were counted.

Keywords: Bee; Apis mellifera; Vespa velutina; Traps; Electric harps

Tarcea, M., Matran, I. M., Martin-Hadmas, R., Muntean, D. L., Ciurba, A., Rotaru, M. (2021). Nutraceutics, nutricosmetics, and mollecular cosmetics usage around the world. *Millenium, 2*(ed espec nº8), 37-37.

NUTRACEUTICS, NUTRICOSMETICS, AND MOLLECULAR COSMETICS USAGE AROUND THE WORLD

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Background: Increasing life expectancy, the development of technology, access to information, including health and beauty, have led to a change in the perception of quality of life and to new strategies of industry companies such as food, pharmaceutical and cosmetics, for developing new product ranges like nutraceuticals, nutricosmetics, cosmetics or molecular cosmetics. We aim to identify the legislative status of all these products in several regions of the world (Australia, Canada, Russian Federation, India, Japan, South Korea, New Zealand, USA and the European Union) supplemented by the identification of the pharmacological mechanisms.

Materials and methods: The PubMed, Medline, ResearchGate databases and online portals of the authorities responsible for authorizing the placing of these products on the market and in these regions were analyzed, also industrial property database (patents-Espacenet) and global trademark registration database-WIPO-IP-Global.

Results: Although not all products ranges are regulated by law, there are areas regulated in some countries, such as: nutraceuticals in Australia, Russian Federation (RF), India, South Korea (SK) and New Zealand, nutricosmetics in India and Japan, food supplements/eubiotics in Australia, RF, India, SK, USA and EU, parapharmaceuticals in Australia, RF, India, and EU (Pharmacopoeia), and cosmetics in Australia, India, USA and EU. Unlike nutricosmetics and cosmetics which are regulated in certain countries, molecular cosmetics are not regulated by law in any country, being a marketing element.

Conclusions: Given the continued growth in global sales, it is useful to facilitate the import-export harmonization of legislative regulations between several states, or to publish a common international guide.

Keywords: Nutraceuticals; Nutricosmetics; Food supplements; Parapharmaceuticals; Molecular cosmetics

Ferreira, J., Esteves, B., Cruz-Lopes, L., Domingos, I. (2021). Maritime pine land use environmental impact evolution in the context of life cycle assessment. *Millenium, 2*(ed espec nº8), 38-38.

MARITIME PINE LAND USE ENVIRONMENTAL IMPACT EVOLUTION IN THE CONTEXT OF LIFE CYCLE ASSESSMENT

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Portugal has committed internationally with the goal of a net zero carbon footprint ("carbon neutrality") by 2050. It means that its greenhouse gas emissions should be reduced so that the balance between emissions and removals from the atmosphere, namely using forests, will be zero. It implies reducing greenhouse gas emissions by more than 85%, compared to 2005, and ensuring an agricultural and forestry carbon sequestration capacity of around 13 Mt.

Life cycle assessment (LCA) is one of the best technics to better understand and address the environmental impacts associated with the land use including land occupation and land transformation of forest products like maritime pine.

The purpose of this work was to study the evolution of maritime pine land use environmental impact between 2005 and 2015. The SimaPro software and the ILCD 2011 Midpoint+ method that uses the model by Milà i Canals was chosen to assess the “land use” environmental impact.

Results show that land use impact category increases 9.6% during the studied period because of the variation in land occupation and forest production. The main contribution for results is forest land transformation into forest road (54%) followed by the forest occupation (40%). Forest road occupation represents only 6% and transformation from forest is a process with a slightly beneficial contribution (-0.3%) to the global result. These results were expectable because during the study period the maritime pine forest area presented a reduction of 84700 hectares and the volume of growing wood decreased of about 15 million cubic meters.

Keywords: Forest; Land use; Land occupation; Life cycle assessment; Maritime pine

Domingos, I., Ayata, U., Ferreira, J., Cruz-Lopes, L., Brás, I., Esteves, B. (2021). Heat treatment of Duka Wood. *Millenium, 2*(ed espec nº8), 39-39.

HEAT TREATMENT OF DUKA WOOD

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Duka wood was heat treated in order to improve dimensional stability and durability. The changes in chemical composition of wood during thermal treatments are responsible for this improvement. Duka (Tapirira guianensis) were heat treated according to Thermowood ® method in an industry in Gerede, Turkey. The treatment temperature was 212ºC and two different treatment times were used, 1h and 2h. Extractives in dichloromethane, ethanol and water were determined and analyzed by GC-MS and existing compounds were identified by NIST17 database. Lignin, cellulose and hemicelluloses were also determined.

With heat, the original extractives are degraded or leave the wood, but new extractable compounds for mild treatments are formed leading to the increase in extractive content. Results shown that the extractives in dichloromethane and ethanol have several compounds normally associated to lignin thermal degradation that increase along the treatment, namely: vanillin, syringaldehyde, vanilic acid and siringic acid. Most of the compounds detected in semi-polar and polar extracts were derived from carbohydrate degradation like some hydroxy acids, deoxy-pentonic acids and levoglucosan.

At the same time, the structural compounds most affected were hemicelluloses that presented the highest decrease. Although cellulose is more resistant than hemicelluloses, was the second most affected compound probably due to the degradation of its amorphous content. Lignin percentage increased along the treatment which does not mean that there was an increase in lignin content but rather that its decrease was lower than the decrease for the other compounds.

Keywords: Heat treatment; Chemical composition; Tapirira guianensis

Ferreira, J., Esteves, B., Cruz-Lopes, L., Domingos, I. (2021). Sustainable consumption of fruits: A life cycle assessment study. *Millenium, 2*(ed espec nº8), 40-40.

SUSTAINABLE CONSUMPTION OF FRUITS: A LIFE CYCLE ASSESSMENT STUDY

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Sustainable Consumption and Production (SCP) is an integral part of the 2030 Agenda for Sustainable Development that globally means to do more and better with less. Minimizing the use of natural resources and toxic materials as well as the emission of waste and pollutants over the life cycle of the service or product is crucially to achieve the SDG12.

Life cycle assessment is an acknowledged tool to assess the environmental impacts of products through its life cycle playing an important role in the transition towards Sustainable Production and Consumption patterns (SPC).

The aim of this study is to compare the environmental profile of the fruit apple, kiwi, orange, and grape to support the provision of information to consumers on the most environmentally friendly fruit, contributing to sustainable consumption. The impact assessment method used is ReCiPe 2016 Endpoint (H) V1.04.

The results show that grapes are the fruit less sustainable from an environmental point of view. Apples are 70% more sustainable than grapes followed by kiwi (49 %) and orange (4.7 %). At damage level, kiwi presents the highest impact in “human health” and “resources depletion” while orange presents the lowest. Considering impacts in “ecosystems” (the most significant area of damages after normalization), apples are the best fruit to consume and grapes the worst. These results does not take into account nutritional aspects and others related to diet’s diversification.

Keywords: Food wheel; Fruit; Health food; Life cycle assessment; Sustainable consumption

Domingos, I., Ayata, U., Ferreira, J., Cruz-Lopes, L., Brás, I., Esteves, B. (2021). Chemical changes in heat treated Afrormosia wood. *Millenium, 2*(ed espec nº8), 41-41.

CHEMICAL CHANGES IN HEAT TREATED AFRORMOSIA WOOD

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Heat treatment is a known process to improve dimensional stability and durability of lower value woods. The changes in chemical composition of wood during thermal treatments are responsible for this improvement. Afrormosia (Pericopsis elata) was heat treated according to Thermowood® method in Gerede, Turkey. Lignin, cellulose, hemicelluloses and extractives in dichloromethane, ethanol and water were determined. Wood extracts were analyzed by GC-MS and the compounds found were identified by NIST17 database.

Results have shown that the most affected structural compounds were hemicelluloses that presented the highest decrease. The second most affected compound was cellulose probably due to the degradation of its amorphous content. Lignin percentage increased along the treatment which does not mean that there was an increase in lignin content but rather that its decrease was lower than the decrease for the other compounds. Even though untreated woods have already a high amount of extractable compounds, heat treatment increased the amount content of extractives along the treatment for Afrormosia wood.

The analysis of the extracts obtained mainly in non-polar and semi polar solvents showed several compounds that are generally linked to lignin thermal degradation that increased along the treatment, namely: vanillin, syringaldehyde, vanilic acid and siringic acid. For more severe treatment, also coniferaldehyde, sinapaldehyde and acetovanillone were found. Most of the compounds detected in semi-polar and polar extracts were derived from carbohydrate degradation like for example some hydroxy acids, deoxy-pentonic acids and levoglucosan, a compound found before as a result from cellulose thermal degradation.

Keywords: Chemical composition; Heat treatment; Pericopsis elata

Manoharan, T., Nadarajah, K. (2021). A preliminary investigation of biochar derived from neem chips for the removal of mancozeb, an emerging contaminant. *Millenium, 2*(ed espec nº8), 42-42.

A PRELIMINARY INVESTIGATION OF BIOCHAR DERIVED FROM NEEM CHIPS FOR THE REMOVAL OF MANCOZEB, AN EMERGING CONTAMINANT

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Emerging contaminants (ECs) are either naturally or synthetically occurring chemical substances in the environment. ECs are found in all most all the products that are used by humans daily. There are many ECs polluting the environment resources in Sri Lanka due to intensive farming practices. This study comprehensively investigated the potential of neem biochar material pyrolyzed at different temperatures in removing mancozeb, a potential EC reported to significantly pollute water sources in Sri Lanka. Results revealed that biochar pyrolyzed at 900°C exposed higher adsorptive performance of 187.68 mg/g than biochar pyrolyzed at 300°C, 500°C and 700°C. The outcomes of the XRD suggest that the functional properties of biochar (surface functional group and carbon network) are strongly influenced by pyrolysis temperature. The biochar pyrolyzed at 900°C exhibited lower surface functional group and stronger hydrophobic carbon network.

Isotherm analysis using isotherm models (Langmuir, Freundlich and Temkin) indicated that the use of Freundlich model for explaining the nature of mancozeb adsorption to the surface of the neem chip biochar pyrolyzed at 900°C is well fitted. It is also suggested that the adsorption is heterogeneous and multilayer in nature. Moreover, the XRD analysis performed before and after adsorption of mancozeb indicated that hydrophobic functional groups actively participated in mancozeb adsorption. Hence, this innovative process of the use of biochar produced from neem chip for the removal of mancozeb makes an opening for the development of cost-effective and eco-friendly technology for commercial level EC removal applications.

Keywords: Biochar; ECs; Isotherm; Mancozeb; XRD

Dilrukshi, I., Nadarajah, K. (2021). Fabrication and preliminary investigation of a simple biogas plant for cattle industry. *Millenium, 2*(ed espec nº8), 43-43.

FABRICATION AND PRELIMINARY INVESTIGATION OF A SIMPLE BIOGAS PLANT FOR CATTLE INDUSTRY

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A simple biogas plant was fabricated using 70 L capacity PVC tank, shaker, a structured inlet and outlet for slurry handling, gas collection system and temperature monitoring device. This research activity is highly important at present to increase the use of renewable resources with an intention of minimizing environmental pollution. The biogas plant designed was tested with 10% headspace and 12% of Total Solid (TS) concentration of the slurry. The experimental setup was preliminary evaluated with no stirring. The temperature, pH, VS (Volatile Solid), TS, DO (Dissolve Oxygen), MC (Moisture Content) and biogas yield were recorded daily. The results revealed that TS, pH and DO reduced with incubation time, while temperature and VS expressed no uniform pattern. The TS and DO played a key role in the biogas production. The value of TS and DO is 9.3% and 3.8 mg/L respectively after 30 days of incubation. The biogas generation was insignificant under these experimental conditions provided. The slurry with a mixture of inoculum and intermitted stirring are suggestions for better biogas production by this simple biogas plant in future. This innovative scientific study will be beneficial for small scale farmers to increase their renewable energy consumption for environmental sustainability.

Keywords: Fabrication; Cattle Slurry; Biogas; Renewable Energy; Pollution

Chandraruban, N., Nadarajah, K. (2021). A comprehensive evaluation of oxygen dynamics and paddy hydration during conventional soaking of paddy parboiling process. *Millenium, 2*(ed espec nº8), 44-44.

A COMPREHENSIVE EVALUATION OF OXYGEN DYNAMICS AND PADDY HYDRATION DURING CONVENTIONAL SOAKING OF PADDY PARBOILING PROCESS

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Paddy parboiling is very popular in Sri Lanka as rice is considered to be a staple food. However, it generates significant amount of effluent with higher BOD values, resulting in significant environmental pollution. The information about DO profile, grain hydration and quality of soaking water of paddy parboiling is very limited and needs to be scientifically exploded. Hence, an attempt was developed to investigate DO profile of soaking water of paddy parboiling in order to propose a viable strategy for reducing effluent quantity and strength in terms of BOD for the environmental sustainability. A column experiment was conducted with long paddy grains using conventional soaking concept for a period of 48 hours. The DO profile, TDS, TS, EC, pH and BOD of soaking water were measured using standard procedures and equations along with hydration profile of paddy grain during soaking. Results revealed that paddy grains reached 30 % moisture content (wb) after 48 hours of soaking and a rate of moisture absorption was higher during first 24 hours. The DO concentration drops to 0.89 mg/L from 7.91 mg/L during the 48 hours of soaking. The changes in TDS, TS and EC had an increasing trend with soaking time and the pH and DO decreased with soaking time. This comprehensive study therefore is highly useful for researchers and industrial people for proposing viable option to mitigate effluent generation and improve paddy hydration during the soaking process of paddy parboiling for the environmental sustainability.

Keywords: Cold water; Dissolved oxygen profile; Evaluation; Paddy parboiling; Pollution

Cruz-Lopes, L., Dulyanska, Y., Domingos, I., Ferreira, J., Esteves, B. (2021). Chemical composition of cherry seeds prunus avium – preliminary studies. *Millenium, 2*(ed espec nº8), 45-45.

CHEMICAL COMPOSITION OF CHERRY SEEDS PRUNUS AVIUM – PRELIMINARY STUDIES

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Cherry is the common name for several species of Rosaceae family, Prunoideae subfamily, and Prunus genus that have their origin in the Asian continent. In this context, it is intended to contribute to the scientific development on ecovalorization at the level of by-products and to provide new strategies for their transformation into value-added products. This work aims to make an exhaustive chemical characterization of the cherry seeds for a better understanding of the possible products that can be obtained from this material. The complete chemical characterization of the various components was performed. Extractives were determined by standard Tappi T 204 om-88. The protein content was determined by the treatment of the extracted sample with a 1% solution of pepsin in 0.1 M HCl. Tannin content was determined by the treatment a sample without extractives and proteins with a solution of NaOH at 0.3% (m/v). The lignin content was determined by Klason method. The cellulose content was determined by the Kürscher and Höffner method. The results showed that the major component is Klason lignin, with 36,03%, followed by cellulose, with values close to 21,32%, 13,71% for tannin and having 7,00%, 5,82% and 0,65% for extractives in methanol:water, acetone and ethanol, respectively. This residue is a lignocellulosic material and can be used in the production of liquor, which can replace polyurethane in the production of foams or the phenol formaldehyde in the production of adhesives.

Keywords: Cherry seeds; Chemical composition; Prunus avium L.; Ecovalorisation; Residues

Cruz-Lopes, L., Dulyanska, Y., Domingos, I., Ferreira, J., Esteves, B. (2021). Ecovalorization of Sweet Cherry Seeds–preliminary studies. *Millenium, 2*(ed espec nº8), 46-46.

ECOVALORIZATION OF SWEET CHERRY SEEDS–PRELIMINARY STUDIES

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Sweet cherry (Prunus avium L.) is one of the most cultivated cherry trees. The seeds are not used for food and are generally considered agricultural waste by the processing industry and must be discarded, typically through burning. Thus, seeds removal and disposal substantially raise production costs and contributes to pollution. The objective of this work was to contribute to the development of scientific knowledge concerning the ecovalorization of industrial waste by liquefaction with polyhydric alcohols of sweet cherry seeds. Liquefaction of sweet cherry seeds was carried out in a 600 mL cylindrical glass PARR PED reactor with double coating. The final solution was solubilized in methanol. The percentage of liquefaction was determined according to the solid residue obtained at the time of filtration. Trials were carried out at different particle sizes; different temperatures: 140, 160, and 180 ºC and liquefaction time ranged between 15-120 min. The results obtained in the optimization of time between 15 and 120 minutes, for <80 mesh and 160ºC allowed to verify that the best percentage of liquefaction (76%) for sweet cherry seeds (Prunus avium L.) were obtained using 120 minutes, 180ºC and <80 mesh.

Keywords: Strawberry tree fruits; Liquefied; Arbutus unedo L.; Ecovalorisation; Residues

Aires, P., Esteves, B., Cruz-Lopes, L., Domingos, I., Ferreira, J. (2021). Plastic or glass for mineral water packaging: a life cycle assessment study. *Millenium, 2*(ed espec nº8), 47-47.

PLASTIC OR GLASS FOR MINERAL WATER PACKAGING: A LIFE CYCLE ASSESSMENT STUDY

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Packaging plays a crucial role in protecting the original purity and unique specificities of natural mineral waters, ensuring they remain pure and microbiologically safe. The most used packaging material for bottled water is PET (polyethylene terephthalate) and glass but from an environmental point of view which is the best? The answer can be found through an objective life cycle comparison between those packaging materials.

The aim of this study is to compare the environmental profile of mineral water beverages (PET 0.5 L one-way vrs PET 1.5 L one-way vrs Glass 1.0 L refillable) to support the provision of information to consumers, contributing for a more sustainable consumption.

Life cycle assessment (LCA) as described in ISO 14040/44 series of standards is the methodology used to assess the environmental impacts of products from a cradle-to-gate perspective. Data for beverages production is obtained from Ecoinvent database and the ReCiPe 2016 Endpoint impact assessment method available in SimaPro LCA software is used to compare the environmental profile of beverages.

The results show that PET 0.5 L is the beverage less sustainable from an environmental point of view. PET 1.5 L and Glass 1.0 L are about 30% more sustainable than PET 0.5 L. PET 1.5 L is slightly better than Glass 1.0 L. At damage level, PET 0.5 L presents the highest impact in “human health” (the most significant area of damages after normalization) and “resources depletion” while Glass 1.0 L presents the lowest impact. Considering impacts in “ecosystems”, Glass 1.0 L is the worst beverage while the PET 1.5 L is the best.

Keywords: Glass; Life cycle assessment; Mineral water; Package; PET

Jayasuriya, N., Nadarajah, K. (2021). Thermodynamics and rate limiting factor analysis of Methylene Blue adsorption by selected bioserbents. *Millenium, 2*(ed espec nº8), 48-48.

THERMODYNAMICS AND RATE LIMITING FACTOR ANALYSIS OF METHYLENE BLUE ADSORPTION BY SELECTED BIOSERBENTS

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Water pollution by industrial dyes is a growing concern nowadays. Methylene blue (MB) is a commonly used industrial dye, polluting the water significantly. However, currently used MB removal methods are costly and complex. The use of bioserbents for the removal of industrial dyes is an emerging concept and needs proper scientific explanations for understanding the removal mechanism. A research was therefore performed with selected bioserbents, palmyrah sprout casing, king coconut husk, coconut kernel, lime peel and manioc peel for the removal of MB from the aqueous phase. Results revealed that the bioserbent, palmyrah sprout casing, exhibited a better removal performance of 27.673 mg/g and it was selected for detailed thermodynamics and rate limiting factor analysis to explain the adsorptive mechanism. Outcomes of thermodynamics and rate limiting factor analysis stated that adsorption of MB by palmyrah sprout casing is exothermic and spontaneous. The initial stages of adsorption are influenced by mass diffusion followed by intraparticle diffusion. The information obtained in this study is highly useful for understanding the adsorption mechanism of palmyrah sprout casing to develop activated carbon with an improved adsorptive performance from this novel bioserbent.

Keywords: Methylene blue; Bioserbents; Rate limiting factor; Analysis; Thermodynamics

Duarte, J., Cruz-Lopes, L., Esteves, B. (2021). Chemical Characterization of Hazelnut Shell (Corylus avellana L.). *Millenium, 2*(ed espec nº8), 49-49.

CHEMICAL CHARACTERIZATION OF HAZELNUT SHELL (CORYLUS AVELLANA L.)

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The Hazelnut Shell (Corylus avellana L.) consists of two types of components: structural and non-structural. Structural components are part of cells; are macromolecules of polymeric nature, in this type of components are included cellulose, lignin, hemicelluloses. Non-structural components, are extracellular, obtained by physical processes (extraction and ash).

This work intended to make a chemical characterization of the Hazelnut Shell (Corylus avellana L.) in order to have a better perception of the benefits of this material for the production of value added products. The chemical composition of solids resulting from pre-hydrolysis using a temperature of 170ºC for 180 minutes, were performed for the 40-60 mesh fraction , according to Tappi T 264 om-88 Standard. Extractives were determined in accordance with Tappi T 204 om-88. Acid-insoluble lignin was determined by Klason method (Tappi T 222 om-02) and soluble lignin according to Tappi UM 250. The holocellulose content was determined by the chlorite method. The initial values were adjusted removing the contribution of extractives. All values were corrected to 100%.

The results showed that the initial holocellulose content was 64.45% reducing to 51.34 % after the hydrolysis while Klason lignin was 35.55%. and increased to 48.66%, respectively. These results showed that pre-hydrolysis was efficient in concentrating the lignin amount in the material, which will allow its further use in adhesives or highly resistant rigid polyurethane foams.

Keywords: Hazelnut Bark; Chemical Composition; Corylus avellana L., Ecovalorization; Waste

Duarte, J., Cruz-Lopes, L., Esteves, B. (2021). Hydrolysis of hazelnut shells in the biorefinery context. *Millenium, 2*(ed espec nº8), 50-50.

HYDROLYSIS OF HAZELNUT SHELLS IN THE BIOREFINERY CONTEXT

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The production of hazelnuts (Corylus avellana L.) at the national level is about 329 ton/year according to the agricultural production statistics report of the National Institute of Statistics (INE). Most of its applicability is in the food industry for chocolate production and dry fruit consumption.

In this context, the ecovalorization of these renewable resources is needed, which can later be used in the production of high added value products by replacing petroleum in several applications. The aim of this study was to perform an hydrolysis of Corylus avellana L. shell with just water and pressure in order to allow the solubilization of extractives, hemicelluloses and possibly some cellulose that can be used later on to produce sugars or other additives, This procedure will therefore, concentrate the amount oflignin in the solid phase, allowing its further processing for an integral valorization of the raw material. Temperature (160 and 170ºC) and time (0 and 180 min were optimized to obtain the highest amount of liquefaction,). The hydrothermal process was carried out in a 600mL PARR LKT PED reactor with double coating. The percentage of liquefaction was determined in accordance with the solid residue obtained by filtration.

The results obtained showed that there was an increase in yield with increasing time; from 2.07% (15 min) to 18,55% (180 min) for160ºC andfrom 6.98% (15 min) to 22,46% (180 min) for 170ºC.

Keywords: Hazelnut Bark; Hydrolysis, Corylus avellana L., Ecovalorization; waste.

Viana, H., Gaião, D. (2021). Inventory, phytosanitary diagnoses and biomechanical assessment of Viseu urban trees. *Millenium, 2*(ed espec nº8), 51-51.

INVENTORY, PHYTOSANITARY DIAGNOSES AND BIOMECHANICAL ASSESSMENT OF VISEU URBAN TREES

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The city of Viseu, is the capital of a District located in Center of Portugal, with a population of around 70 thousand inhabitant living in the urban area. The city has several green spaces, among municipal parks, woods and gardens, with trees, which are fundamental for the population's wellbeing.

This work shows the inventory of trees carried out in the streets and main parks of Viseu. The methodology consisted in: i) measuring the biophysical parameter; ii) register the geographical position by accurate GNSS; iii) photography; iv) biomechanical and phytosanitary evaluation and v) quantify the Environmental benefits. A total of 19015 trees were measured: 9360 in streets, 1436 in gardens, 773 in Park Aquilino Ribeiro and 7446 trees in Fontelo forest.

The trees' diversity includes 45 families and 147 species: Acer negundo (13,6%), Liquidamber styraciflua (8.5%) and Tilia tomentosa (6%) are the most representative. This urban forest provides significant ecosystem services. The structural value accomplish a total of 24,5 million € and represent around 5662 ton of stocked Carbon (~579 thousand €). The annual benefits comprise 252 ton C.yr-1 (25 thousand €.yr-1); 6.4 thousand m^3.yr-1 of avoided runoff (54 thousand €.yr-1) and 6.2 ton.yr-1 of pollutant removed from atmosphere (4.9 thousand €.yr-1). However, the hazard evaluation evidenced serious damages and deficiencies in the structures of many trees and predisposition and induction factors contributing for their decline.

The information collected is fundamental for the management of urban trees and forests, Civil protection, and conception of public policies related to city planning.

Keywords: Urban tree inventory; Ecosystem services; Phytosanitary diagnoses and Biomechanical assessment

This work is supported by : FCT - Portuguese Foundation for Science and Technology - Project UIDB/04033/2020

Weber, M., Cruz-Lopes, L., Guiné, R. (2021). Food Packaging: Practices, knowledge and concerns. *Millenium, 2*(ed espec nº8), 52-52.

FOOD PACKAGING: PRACTICES, KNOWLEDGE AND CONCERNS

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The food sector, due to its requirements related to food security and quality, associated with the huge amounts of foods produced and consumed every day is responsible for an enormous quantity of disposed packaging materials. Hence, the objective of this study was to investigate in a sample of Portuguese citizens the practices regarding recycling of food packages and evaluate the level of knowledge about the harmful effects of plastic materials on the environment. For this was prepared a questionnaire that was approved by the Ethics Committee and delivered to participants through the internet.

The results obtained showed that people tend to choose plastic containers due to the low price, the assurance of the quality of the product contained inside and food security. About 20% thinks about the negative impacts of plastic packaging, but buy them anyway, while 40% sometimes avoid buying them and 30% look for alternative materials. People are generally aware of the negative impact of plastics on human health, animal welfare and natural ecosystems. As a way to minimize the impact most people do recycling of packaging materials and tend to avoid plastic utensils and containers.

In conclusion, people are becoming more and more aware of the negative impacts of plastic materials on the global sustainability of the planet and on human and animal health.

Keywords: Plastic; Package; Environment; Recycling; Sustainability

Brás, I., Tavares, A., Silva, T., Pereira, J., Silva, M. E. (2021). Green chemistry: Determination of humic compounds, humic acids and fulvic acids by low volume colorimetry. *Millenium, 2*(ed espec nº8), 53-53.

GREEN CHEMISTRY: DETERMINATION OF HUMIC COMPOUNDS, HUMIC ACIDS AND FULVIC ACIDS BY LOW VOLUME COLORIMETRY

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Green chemistry relates to the use of a set of principles that reduce or eliminate the use of hazardous substances in the production and application of chemicals. Due to the need to minimize risks and the pollution generated by chemical activities, new methodologies must be developed that avoid the application or the amount of dangerous products. In this context, and with a focus on the prevention of pollution, this work proposes the quantification of humic substances (SH), applying a methodology that reduces the amount of hazardous reagents (sodium dichromate and sulfuric acid), minimizing the production of waste. The SH quantification methodology uses a spectrophotometric reading at 590 nm, after the oxidation of the extracted SH. In the proposed methodology, the oxidation phase is carried out in a digester with reduced reagent volumes compared to the traditional method. The methodology validation involved the analysis of the parameters used for this purpose. The limits of detection and quantification were 0.166 g glucose/L and 0.431 g glucose/L, respectively. The precision and accuracy were also evaluated using the repeatability limit and performance test, respectively, with a repeatability limit of 65 mg/L and a Zscore of less than 2. For selectivity and robustness, differences in variances were not significant comparing with traditional methods, and the working range is well adjusted, with no differences regarding their precision. The results obtained showed that the method under study, adapted to the principles of green chemistry, can be applied to impure and complex samples.

Keywords: Green Chemistry; Fulvic Acids; Humic Acids; Humic substances; Validation of Analytical Methods

Brás, I., Rabaça, T., Silva, M. E., Lopes, S., Viana, H. (2021). Wildfire prevention using animal grazing and prescribed burning: 1- Initial Soil Characterization. *Millenium, 2*(ed espec nº8), 54-54.

WILDFIRE PREVENTION USING ANIMAL GRAZING AND PRESCRIBED BURNING: 1- INITIAL SOIL CHARACTERIZATION

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Portugal has been devastated with wildfires affecting forest stands and shrubland. The present work reports the first phase of a global project - Landscape Fire– that aims to evaluate and compare two techniques for rural wildfire prevention: grazing and prescribed burning. This task consist in the Physico-chemical characterization of soil before proceeding with the prevention methods.The study area is located in the Montemuro Moutain, in the center of Portugal, with 1381 meters at its highest point, displaying a clearly asymmetrical triangular geomorphology. The local bedrock is mainly composed by igneous and metamorphic rocks. Two terrains were chosen and subdivided in four areas. Soil composite samples were taken, at the surface and at 20 cm deep. After proper sampling and quartening, several physical and chemical parameters where evaluated: particle size, pH, conductivity, moisture content, organic matter, ashes, nitrogen, nitrates, carbonates, ionic exchange capacity as well as exchange bases. The data were treated and compared in a geographic information system environment.The results shown that the land occupation is mainly grazing (terrain 1) and shrubland with low biomass (terrain 2). The soils particles size. shown a majority of sand, with low levels of silt and clays, slightly acidic, with low levels of organic content and nitrogen high amounts of carbonates and exchange basis. The preliminary results are the start point to evaluate the prevention strategies impact to be applied in the next phase, to choose the best fire mitigation strategies and to reduce the environmental and economic cost of wildfires.

Keywords: Wildfire prevention; Grazing; Prescribed burning; Soil characterization; Geographic information system (GIS); Landscape Fire

Silva, M. E., Silva, L., Brás, I., Domingos, I., Wessel, D., Ferreira, J. V. (2021). Environmental impact assessment of the waste management in a countertop production based on LCA approach. *Millenium, 2*(ed espec nº8), 55-55.

ENVIRONMENTAL IMPACT ASSESSMENT OF THE WASTE MANAGEMENT IN A COUNTERTOP PRODUCTION BASED ON LCA APPROACH

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Consumerism has led to an increasing in environmental problems, and for this reason, sustainable solutions must be the priority when designing new products or services. Life Cycle Assessment (LCA) is one of the most important analytical tools available to choose the best decision when it comes to sustainability.

The focus of this study was to apply LCA to the management of wastes resulted from a countertop production. The countertop panel is made of a ceramic sheet on a lamellar panel substrate, formed by polyamide plastic and PVC, which is intended to be water, scratch, and impact resistant. The wastes resulted from this production are polyamide and PVC plastics and ceramic. The wastes management scenarios study was landfilling (current practice) and waste valorization. The LCA methodology was followed and the EPD 2018 method available in the SimaPro software was chosen to quantify the environmental impacts of wastes. The environmental impact categories studied were eutrophication, global warming, photochemical oxidation, ozone layer depletion and abiotic depletion and acidification.

Our results showed the two plastic wastes to be the main contributors for the Acidification, Eutrophication and Global Warming. However, for Photochemical Oxidation and Water Scarcity, the ceramic component waste is the main contributor. Comparing the two scenarios, wastes valorization decreases all the environmental impacts' categories analyzed comparing with landfilling.

Keywords: Countertop; Life Cycle Assessment; Valorization; Waste

Cruz-Lopes, L., Esteves, B., Domingos, I., Ferreira, J. (2021). Under the concept of biorefinery - Eco valorisation of barks from Arbutus unedo L.. *Millenium, 2*(ed espec nº8), 56-56.

UNDER THE CONCEPT OF BIOREFINERY - ECO VALORISATION OF BARKS FROM ARBUTUS UNEDO L.

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The strawberry tree (Arbutus unedo L.) is generally considered a small tree, usually smaller than 5 m, being cultivated especially in Mediterranean countries. Although the bark and branches of Arbutus unedo tree are currently used in the production of biomass fuels, they might be used as a source for higher value products.

Ecovalorisation of these renewable resources can be made by converting them into liquid mixtures that can later be used in the manufacture of products to replace petroleum-based products. The objective of this study was to produce a liquefied material from internal and external bark of Arbutus unedo. The liquefaction process was carried out in a PARR reactor with double coating. The final solution was solubilized in methanol. The percentage of liquefaction was determined according to the solid residue obtained by filtration. All liquefaction parameters were optimized and evaluated to obtain the best liquefaction, such as granulometry (> 40 to < 80 mesh), temperature (140 to 200 ºC) and time (0 to 60 min).

The results showed an increase in yield with increasing liquefaction time from 88% (15 min) to 93% (60 min) for internal bark and from 67% (15min) to 78% (60 min) for external barks of Arbutus unedo L. using a temperature of 160 ºC and a granulometry <80 mesh. These results show that it is possible to achieve a useable polyol from the liquefaction of these barks using polyalcohol liquefaction. This polyol can be latter transformed into a polyurethane foam as already done for several different materials.

Keywords: Strawberry Tree; Liquefied Material; Arbutus unedo L.; Ecovalorisation; Residues

Costa, C. A., Monteiro, A. R., Ribeiro, A. R., Andrade, A. S., Andrade, B. F., Belchior, C., Monteiro, D., Coutinho, E. (2021). Affirmation of women in the rural community. *Millenium, 2*(ed espec nº8), 57-57.

AFFIRMATION OF WOMEN IN THE RURAL COMMUNITY

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Introduction: Throughout time, women have played an important role in agricultural activities, but their contribution has been mostly unrecognized by society. Objective: To understand the contribution of women in the rural community, across three generations. Methods: Qualitative study using life histories. Four Portuguese families connected to agriculture participated, 11 active participants and 7 participants not active in farming activities. Ethical principles were respected, informed consent and approval by an ethics committee was obtained. Results: Three categories emerged. The affirmation of the woman in the rural community, with emphasis on the woman organizing the grape harvests, the reaping, the corn husking and having been the second woman in the village to have a driver's license. Who she learned from what she knows about agriculture consists of learning from her parents, maternal grandmother, wife, mother, spouse, parents, grandparents, and learning on self-initiative. Difference between women and men in agriculture, with the biggest differences being that men have more strength, but women are more active and can do everything like or even better than the men, they have more sensitivity to take care of the plants, and that there is inequality in the division of tasks between men and women and in the payment for a day's work. Conclusion: Women have an active participation in the organization of agricultural activities, learning mainly from their parents. There are differences between women and men, men are stronger, but women are more active and can do everything men can do or even better than men, and have more sensibility to take care of the plants.

Keywords: Woman; Man; Community; Society; Agriculture

Gomes, J. P., Santos, J., Leitão, S., Almeida, T., Antunes, J., Reis, P. (2021). Trends in the red wine market in Portugal and Brazil. Study of the economic and financial viability of an Online marketing project. *Millenium, 2*(ed espec nº8), 58-58.

TRENDS IN THE RED WINE MARKET IN PORTUGAL AND BRAZIL. STUDY OF THE ECONOMIC AND FINANCIAL VIABILITY OF AN ONLINE MARKETING PROJECT

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The wine sector is of great strategic importance for Portugal, both for its high economic value and its multiplier effect. The wine market has seen a significant expansion in the last decade, and this is evident both in quantity traded and the quality and notoriety achieved. On the other hand, this activity is of particular importance due to the employment generated in the production of grapes and wine and the rural world's development.

This work aims to understand the trends of the wine market, both in terms of the type of wine consumed and in the wine regions, to analyze the profile of the consumer and understand which are the main factors in the decision to purchase a particular wine brand. The Portuguese and Brazilian markets were studied, the latter as a potential export market.

The methodology was based on the literature review, the analysis of the sector's statistical data, and the realization of an empirical study. This empirical study was based on a quantitative study, through the application of surveys in the two mentioned markets, totaling 414 respondents, using a sampling process for convenience through social networks. For data treatment, the SPSS software was used. The results show the feasibility of an innovative project, based on its brands, through online sales, exclusively to customers of private clubs. The implementation of the project will essentially involve the use of the internet and social networks, namely through a website with an online store, with a personalized delivery service, and creating and maintaining a very close relationship with consumers. The results also show that an analysis of the project's viability and profitability will allow reaching very attractive NPV (236 thousand euros), IRR (21.5%), and payback period (5 years) indicators. Finally, the conclusions, limitations of the work, and clues for future research will be presented.

Keywords: Wine; Export; Online market; Profitability

Gomes, D., Costa, C. A., Pereira, A. A., Magalhães, C., Chaves, C., Bandeira, C., Homem, D., Coutinho, E., Joia, H., Jesus, M., Rosa, R., Martins, S., Neves, T., Farstad, M., Gustavsson, M., Lisboa, M. (2021). Análise do estado da arte: A mulher agricultora. *Millenium, 2*(ed espec nº8), 59-59.

SYSTEMATIC REVIEW OF LITERATURE: FARMING WOMEN

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Women represent, on average, almost half of the agricultural workforce, playing a key role in family farming (United Nations Economic and Social Council, 2017). However, there are few studies that talk about the farming women - generally, are men who dominate speech spaces and for that reason the center of studies in the agricultural sector. Our goal is to make an analysis of the state of the art about farming women through a literary review, which intends to answer this question: Is there gender inequality in agriculture?

Gender analyzes in rural territories involve the intersection of four institutional spaces: the home, the community, the market and the state. The statistical data about the participation of women in the agricultural sector is scarce and mostly produced from concepts and practices that underestimate women's participation in the workforce; and the qualitative data, many of them ethnographic, are about the meanings and representations of living and working conditions. This underestimation of female work is often classified as 'invisibility of women', because woman is placed as the “helper” to the work male figure (usually her husband and father). Several disciplinary areas have used and advocated agroecological methodologies as the best way to fight for feminine emancipation and give more voice and space to the farming women.

Keywords: Farming women; Agriculture; Gender; Rural territories; Agroecology

Tavares, R., Botelho, G. (2021). Development of craft beer with arbutus fruits (Arbutus unedo L.). *Millenium, 2*(ed espec nº8), 60-60.

DEVELOPMENT OF CRAFT BEER WITH ARBUTUS FRUITS (ARBUTUS UNEDO L.)

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The phenomenon of craft beer has been arousing interest among consumers looking for national products, produced on a small scale with natural ingredients and in a sustainable way. Currently, due to the problems that the pandemic COVID-19 caused in the economy in Portugal, the valorization of endogenous resources could bring a strong contribution to the economic, environmental and social revitalization.

The main objective of this work was to evaluate the possibility of incorporating arbutus fruits (Arbutus unedo L.) into the production of craft beer.

Analytical monitoring of four different beer and arbutus fruits formulations was carried out, resulting from different moments in the addition of fruits (fermented and non-fermented) during the craft beer production process. From the four formulations developed, three showed microbiological contamination that made it impossible to obtain an acceptable final product. The only formulation successfully performed was submitted to a sensory test of preference with the original beer, and at the 5% significance level, the results showed that there was no preference with a statistically significant difference between the two beers (with and without arbutus fruits). Regarding the intention to buy beer with arbutus fruits, 46% of the untrained panelists indicated that they would probably buy and 23% would certainly buy this product if it were available on the market.

In conclusion, the development of craft beer with arbutus fruits appears to have a high commercial potential that should be explored in the future.

Keywords: Craft beer; Arbutus Fruits; Innovation; Sensory analysis

Funding: Research Grant, with reference FCT-IPC-i2A-CERNAS/Escola de Verão/BI-01-08, within the scope of the Special Support "Summer with Science", funded by the “Fundação para a Ciência e a Tecnologia” (FCT).

Guiné, R., Brochard, M., Correia, P., Barroca, M. J. (2021). Development of a new pasta product incorporating chestnut flour and bee pollen. *Millenium, 2*(ed espec nº8), 61-61.

DEVELOPMENT OF A NEW PASTA PRODUCT INCORPORATING CHESTNUT FLOUR AND BEE POLLEN

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We can find a huge variability nowadays in pasta formulation either aiming to improve its technological features or its nutritional and health value. The modern trends emphasize the consumption of fortified foods as a way to improve the global health status and wellbeing of the consumers. In this context, the aim of the present work was to incorporate chestnut flour and pollen powder into pasta, to obtain products with improved nutritive and health properties. For this a formulation optimization was carried out and for the selected products as those most promising, a chemical and physical characterization was made.

For the optimization of the formulation, different recipes were tested incorporating chestnut flour in variable proportions (25 to 55%) and pollen powder (5 to 20%). These essays revealed that the best proportions of these ingredients were 50% for chestnut flour and 10% for pollen powder, so in the final phase of the formulation development a recipe was developed with both components. The results of the chemical analyses showed that protein and fibre were higher in the formulations containing pollen while fat increased by the addition of chestnut. Regarding the ash content, it was improved by the addition of both ingredients. Regarding colour, both ingredients turned the pasts a little darker, and also stickier and more adhesive.

So, in conclusion, it is possible to produce pasta incorporating chestnut flour and pollen powder, although some additional studies are still recommended, such as sensorial analyses.

Keywords: Colour; Texture; Nutritional value; Product development; Optimal formulation

Correia, P., Fouche, L., Guiné, R. (2021). From dried chestnuts to hydro-sweet chestnuts. *Millenium, 2*(ed espec nº8), 62-62.

FROM DRIED CHESTNUTS TO HYDRO-SWEET CHESTNUTS

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The aim of this work was to produce hydrated chestnuts in sweet syrup from dried chestnuts. First, the determination of the time/temperature combination for the hydration of the chestnuts was done. The temperatures of 25ºC, 45ºC and 70ºC, and times ranging from 1h to 7h were tested. The chosen binomial time/temperature was 45ºC during 5 hours, to achieve a moisture of 47.6%, near the values encountered for fresh chestnuts. After, the procedure followed to produce the hydro-sweet chestnuts was: a) pressure cooking during 15 minutes in a syrup with 25% of sucrose, keeping them in the syrup during 12 hours; b) boil them during 30 minutes, keeping them during 24 hours in 50% sucrose syrup; c) boil them again during 30 minutes and keep them in the syrup until consumption. The chestnuts were evaluated for moisture, water activity, colour and texture.

Significant changes were found in these studied parameters during the process development. At the end the hydrated chestnuts in sucrose syrup (hydro-sweet chestnuts) presented the following characteristics: moisture content of 44.1%; aw of 0.96; L*, a*, b* of 47.79, 8.077 and 24.791 respectively. The results of the texture parameters were: hardness 17,243 (N); adhesiveness -0.008 (N.s); resilience 9.329 (%); cohesion 0.208 (dimensionless). For the cut test the values were firmness of 4.936 (N) and stickiness of -2.099 (N). This research allowed to develop a new product, but it should still be complemented with further studies, like a consumer acceptance, a market study, and a scale-up for industrial processing.

Keywords: Dry chestnuts; Hydration; Cooking; Sweet syrup; Characterisation

Correia, P., Rodrigues, A., Rodrigues, A., Amaral, A. (2021). Perception about food fraud and labelling. *Millenium, 2*(ed espec nº8), 63-63.

PERCEPTION ABOUT FOOD FRAUD AND LABELLING

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Food fraud has been growing recently, and it is a problem with implications in public health. Apart from other methods, labelling could be a good ally to eliminate this problem. The aim of this work was to understand the people perception about food fraud and label. A group of 103 persons from Viseu city, in Portugal, was inquired. A questionnaire with thirteen questions was applied, divides in two groups: a) 4 questions about sociodemographic data (age, gender, literary qualifications, and occupation); b) 9 questions about consumption data (label reading, main concern at the time of purchase, importance of product origin, knowledge about food additives, food ingredients and allergens, food poisoning, and victim of food fraud).

The majority of the persons have ages between 17 and 25 years old (56.3%), female represents 64%, the main qualification is the secondary level (50.5%), employed (55.3%) and students (26.2%). It was found that the price of the food product is the biggest concern at the time of purchase (69.9%), followed by the shelf-life (54.4%). The majority of respondents show interest in checking the food product label (61.2%), knowing how to identify additives (60.2%) and allergens (59.2%). Respondents are not allergic to food products (62.1%), they did not suffer any food poisoning (76.7%) and food fraud (85.5%). They indicated codfish and octopus as main fraudulent foods, replaced by pollock and Ommastrephidae (from the family of squid) respectively. This study shows that people from Viseu showed knowledge of both food fraud and labelling.

Keywords: Food fraud; Label; Consumers; Survey; Viseu

Junior, S., Guiné, R., Correia, P. (2021). Production of hyper soft breads with castanea sativa flour for fast food chains. *Millenium, 2*(ed espec nº8), 64-64.

PRODUCTION OF HYPER SOFT BREADS WITH CASTANEA SATIVA FLOUR FOR FAST FOOD CHAINS

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The challenge of making healthy and economically viable fast food has been a constant challenge for producers. Chestnut flour is a nutritionally rich and healthy food. This work aims to verify the suitability of chestnut flour for the production of hyper-soft bread, hamburger bread, for fast food chains. The first step was to define the best formulation and procedures for the production of hyper-soft bread using only wheat flour. After this, the optimal amount of chestnut flour to be added to the bread to replace the wheat flour was determined. At a later stage, four types of flours were tested. The breads were subjected to physical-chemical and sensory tests for their characterisation. A financial and feasibility analysis was also carried out for the implementation of the project.

The results showed that the addition of 30% chestnut flour is ideal, with chestnut flour produced from industrially dried chestnuts and grounded in a hammer mill, with a 1mm sieve, the one with the most favorable physicochemical and sensory characteristics for the production of hyper-soft bread. For the execution of the project, an initial investment of € 150,000.00 is required, being recovered after 1 year. The valorization of one of the most abundantly produced dried fruits contributes positively to add nutritional value to the hyper-soft bread used by fast-food chains. From the investor's perspective, the project is immediately viable, as the project is profitable in the first year of investment in the project.

Keywords: Chestnut flour; Bread; Physicochemical Characterisation; Sensory characterization; Financial viability

Ferrão, A. C., Guiné, R., Gonçalves, R., Lopes, A., Ramalhosa, E., Correia, P. (2021). Physical and chemical properties of some hazelnut varieties grown in Portugal. *Millenium, 2*(ed espec nº8), 65-65.

PHYSICAL AND CHEMICAL PROPERTIES OF SOME HAZELNUT VARIETIES GROWN IN PORTUGAL

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Worldwide there has been an increase in the demand for dried fruits. In Portugal, hazelnut is the dry fruit with the less cultivated area, however the country has conditions for a good production. This work intended to analyse the physical and chemical properties of seven hazelnut varieties grown in Portugal, named Negreta, Gunslebert, Tonda de Giffoni, Grada de Viseu, Butler, Segorbe and Longa de Espanha. For that purpose, hazelnut fruits were evaluated for biometric characteristics, apparent and true densities, colour, texture, nutritional parameters (moisture, ash, lipids content, protein, fibre and water activity), oxidative stability index and specific extinction coefficients (K232, K264, K268 and K272).

The results showed that, in general, there were statistically significant differences among the varieties under study. Hazelnuts of variety Longa de Espanha revealed to be more elongated and the variety Butler had heavier fruits, both in shell and kernel. The variety Grada de Viseu was harder in the shell being the kernels of variety Segorbe softer but more resistant to fracture. For all varieties, fat was the major chemical component. The lowest extinction coefficient, K232, was found for Negreta, indicating that this variety presented a lower degree of primary oxidation products. The other specific extinction coefficients were relatively low for all samples. Moreover, Tonda de Giffoni was the variety with the higher oxidation stability.

This work highlighted the differences in hazelnuts according to the variety, confirming the importance to perform more studies in this area since these results can be very useful in the hazelnut sector.

Keywords: Hazelnuts; Fruit; Biometric characteristics; Physicochemical characterisation; Specific extinction coefficients

Anjos, O., Pedro, S. I., Caramelo, D., Semedo, A., Antunes, A. A. L., Canas, S., Caldeira, I. (2021). First characterization of the composition of strawberry tree fruit spirit aged with oak wood. *Millenium, 2*(ed espec nº8), 66-66.

FIRST CHARACTERIZATION OF THE COMPOSITION OF STRAWBERRY TREE FRUIT SPIRIT AGED WITH OAK WOOD

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The fruits of strawberry tree (Arbutus unedo L.), a spontaneous shrub of Portugal and other Mediterranean countries, can be consumed fresh but traditionally they are processed for the production of a spirit. After spontaneous fermentation of these fruits, distillation follows in traditional alembics. The distillate is traditionally marketed without ageing in wood, unlike other distillates such as wine spirit and rum. However, is well know that the ageing with wood improves the spirits' quality, as result of modifications on their volatile, phenolic and sensory profiles.

This pioneer work aimed to characterise the influence of ageing with oak wood (Quercus robur L.) of different toasting levels during 6 months on the volatile composition and sensory quality of Arbutus unedo spirit. The physicochemical characterisation of the samples was comprised acidity, pH, dry extract, and CIELab colour. The volatile compounds (methanol, acetaldehyde, ethyl acetate and fusel alcohols) were quantified by GC-FID. The assessment of sensory quality was performed by the trained panel of INIAV-Dois Portos.

The main finding was the increase of the Arbutus unedo spirit' quality with the ageing process. The best results were obtained with 3 months of ageing with medium toasting level. Further studies are required to understand and characterise this new product.

Keywords: Arbutus unedo spirit; Wood ageing; Chemical and sensory profiles

Guiné, R., Lima, M. J., Castelão, D., Okpala, C., Korzeniowska, M., Florença, S. (2021). Lycopene: sources, bioavailability and effect on human health. *Millenium, 2*(ed espec nº8), 67-67.

LYCOPENE: SOURCES, BIOAVAILABILITY AND EFFECT ON HUMAN HEALTH

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Plants generate antioxidant molecules as a response to external stress, to prevent damage caused by reactive oxygen species in the plant cells. Lycopene is a potent antioxidant, of the carotenoids family, found mostly in red fruits and vegetables such as tomato, watermelon or grapefruit. The intake of this bioactive compound has been associated with many health benefits, and therefore the objective of this chapter is to discuss the role of lycopene for an improved health, while also highlighting the most valuable sources of this molecule. To undertake the review, search for published scientific papers was undertaken in databases such as ScienceDirect and Pubmed/Medline, using appropriate keywords.

The results showed that tomato and tomato products are among the richest sources of lycopene and that some processing operations can in fact enhance the lycopene content and bioavailability, by favoring the transformation of trans into cis forms of lycopene, better absorbed by the human body. Regarding the health effects, it was found scientific evidence of the beneficial action of lycopene on a variety of diseases, including diabetes, obesity, cardiovascular diseases, vascular health, neurodegenerative diseases, such as Alzheimer's, Parkinson, cerebral ischemia or epilepsy, and cancer, namely breast, prostate, gastric, renal and oral cancer.

Keywords: Bioactive compounds; Carotenoids; Lycopene; Health; Plant sources

Ferrão, A., Guiné, R., Lopes, A., Gonçalves, R., Correia, P. (2021). Influence of different parameters on the characteristics of hazelnuts (var. Grada de Viseu) grown in Portugal. *Millenium, 2*(ed espec nº8), 68-68.

INFLUENCE OF DIFFERENT PARAMETERS ON THE CHARACTERISTICS OF HAZELNUTS (VAR. GRADA DE VISEU) GROWN IN PORTUGAL

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"Grada de Viseu" is an indigenous hazelnut variety from Portugal and it is considered by the producers the most important variety in terms of production and productivity. Therefore, the aim of this study was to assess the influence of harvest year (2017/2018/2019) and location of production (Viseu/Faia) on some physical and chemical properties of the variety "Grada de Viseu", namely biometric parameters, colour, true and bulk density, texture parameters (hardness and friability) and chemical composition.

The results showed that the fruits of the samples harvested in 2019 had higher values of height, width and thickness. The samples from 2018 had a clearer shell, independently of the location of production, but only the samples from Faia harvested in 2018 had a clearer kernel. As for texture, the sample grown in Viseu harvested in 2018 had a harder shell and was more resistant to fracture, while the sample from 2019 had a harder kernel. For all samples, fat was the major chemical component. The sample from 2019 had a water activity greater than 0.62, meaning that its stability was not guaranteed. "Grada de Viseu" from Faia in 2018 presented a higher induction period, and therefore, was the sample with the highest oxidation stability. The year of production showed to be the best predictor for almost every chemical and biometric characteristics.

In general, it is possible to verify that the properties of this variety of hazelnut are dependent on the conditions of harvest and also local of production.

Keywords: Chemical properties; "Grada de Viseu"; Harvest year; Location; Physical properties

Pedro, S. I., Azevedo, M., Peres, F., Anjos, O. (2021). Application of NIR and decision trees to differentiate pear fruit filling. *Millenium, 2*(ed espec nº8), 69-69.

APPLICATION OF NIR AND DECISION TREES TO DIFFERENTIATE PEAR FRUIT FILLING

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Fruit fillings has been in high demand concerning the potential different applications, namely cakes, pies, pastry, puree, and several new products. “Pera Rocha do Oeste” is a pear variety with a Protected Designation of Origin (PDO) when produced in the Central West Coast of Portugal. In this present work four fruit fillings, prepared at industrial scale, were characterized: three of them were produced with pear from three orchards located in the PDO region and one was produced with the same variety from an orchard outside this region. The present work aimed to evaluate if NIR spectroscopy can be applied to distinguish between the samples of fruit filings produced with pear from the PDO region in a fast and straightforward way. The characterization of the samples was also performed by water activity, pH, total soluble solids, firmness, CIELab colour, electrical conductivity, protein, lipids, sugars, fibre, and ash content. Multivariate data analysis was applied, namely Principal Component Analysis (PCA) for analytical parameters, spectral results and decision trees. Concerning the statistical results, it was possible to identify a tendency for discrimination of the pear fillings produced in the PDO region. The most relevant parameter that distinguishes the pear fillings produced with pear out of the PDO region was firmness, luminosity and electrical conductivity. The PCA performed with spectral analysis confirm the trend observed with the analytical parameters. Thus, NIR spectroscopy showed a promising methodology to distinguish pear fillings produced with pear from different origins.

Keywords: Fruit filling; “Pera Rocha do Oeste”; Physicochemical parameters; PDO; NIR

Carreira, L., Neves, A., Marreiros, A., El-Guendouz, S., Luís, Â., Anjos, O., Miguel, G. (2021). Study of some biological activities of 9 almond cultivars native from Algarve region. *Millenium, 2*(ed espec nº8), 70-70.

STUDY OF SOME BIOLOGICAL ACTIVITIES OF 9 ALMOND CULTIVARS NATIVE FROM ALGARVE REGION

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Almond is one of the most consumed nuts worldwide, recognized for its health benefits related to the antioxidant capacities and the regulation of immunity and inflammation. The Algarve region has a large germplasm collection of native varieties, from which nine were evaluated relatively to the total phenolics' content (TPC) and the antioxidant activity, which was assessed by the capacity for scavenging free radicals [2,2-diphenyl-1-picrylhydrazyl (DPPH), superoxide anion and nitric oxide (NO)]; and the capacity for inhibiting the tyrosinase (TY) activity using hydroalcoholic extracts was also tested. The higher TPC was found in the hydroalcoholic extract of "Patarata" cultivar, which corresponded to the best capacity for scavenging DPPH free radicals as well superoxide anion radicals. In contrast, the cultivar "Cacela" had the lowest TPC and poor DPPH and superoxide free radical scavenging activities, along with the cultivars "Patarata", and "Zé Dias Miúdo". In what concerns the capacity for scavenging NO free radicals, "Patarata", "Duro da Estrada", "Zé Dias Miúdo", and "Galamba" had similar ability with percentages ranging from 50 to 60% (ascending order). Only one sample had higher than 50% capacity to inhibit TY activity: "Convento" (67%).

The values of antioxidant and anti-inflammatory activities of native Algarve cultivars were similar to cultivars from other regions reported in the literature.

With Principal Components Analyses it was possible cluster some cultivars: the cultivars "Patarata", "Duro da Estrada" and "Zé Duro Miúdo" with higher TPC and antioxidant activity; "Convento" and "Cacela" with lower activity; "D. Amarelo" with higher anti-inflammatory activity.

Keywords: Almond; Algarve cultivars; Antioxidant; Anti-inflammatory; Phenolic compounds

Santos, T., Resende, M., Mendonça, A., Estevinho, L. M., Paulo, L., Anjos, O. (2021). Characterization of physicochemical parameters of "Amarelo da Beira Baixa". *Millenium, 2*(ed espec nº8), 71-71.

CHARACTERIZATION OF PHYSICOCHEMICAL PARAMETERS OF "AMARELO DA BEIRA BAIXA"

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"Amarelo da Beira Baixa" cheese is a cured cheese, produced with raw milk from sheep's or sheep's and goat's, with a semi-hard or semi-soft paste and characterized by a yellow color. It is produced in the central region of Portugal, namely Castelo Branco, with a Protected Designation of Origin (PDO). These cheeses represent 52.6% of the cheeses from Beira Baixa region, which accounting for 25% of the Portugal cheese production.

This work aimed to compare the physicochemical parameters (colour, pH, ashes, salt, moisture content, protein, total lipids, profile of saturated and unsaturated fatty acids, carbohydrates and energetic value) for PDO cheeses (n=34) and cheeses without certification (n=26). The mean values and standard deviations, respectively, that characterize these PDO cheeses for each parameter are: colour (L*: 73,08±10,37; a*: -3,4±1,2; b*: 18,5±4,4), pH: 5.44±0.25; ashes: 4.06±0.56%; salt: 2.34±0.61 g/100 g; moisture content: 42.92±4.34%; protein: 20.98±1.11%; total lipids: 31.23±3.67%; carbohydrates: 0.81±0.74% and energetic value: 368.3±35.4 kcal. The profile of saturated are (SFA) 18.6±1.9 % and unsaturated fatty acids are MUFA: 8.8± 0.5 % and PUFA: 1.4± 0.3 %, also relatively to PDO cheeses.

Only the parameters moisture content/dry extract, protein, pH and two fatty acids (C18:2 and C20:0) present significant differences (Scheffe test with α=0.05) for PDO cheeses compared to those without certifications. The results present in this study denoting a good production process of "Amarelo da Beira Baixa" cheeses, in this region, and that more producer could be aggregated to the PDO.

Keywords: Cheese; "Amarelo da Beira Baixa"; Protected designation of origin; Chemical composition; Lipid profile.

Acknowledgments: Program for the Valorization of Cheese of Portugal´s Center Region, co-financed by the Centro 2020, Portugal 2020, and the European Union through the ERDF. Project code: CENTRO 04-3928-FEDER-000014.

Ramalhosa, E., Marques, F. M., Pereira, J. A., Rodrigues, N. (2021). Determination of shelf life of table olive flours produced from Cobrançosa cultivar. *Millenium, 2*(ed espec nº8), 72-72.

DETERMINATION OF SHELF LIFE OF TABLE OLIVE FLOURS PRODUCED FROM COBRANÇOSA CULTIVAR

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In the present work, flours from table olives from the cultivar Cobrançosa subjected to natural fermentation were prepared. These flours will be added to several dishes or sauces, such as mayonnaises. Only the pulp of the table olives was used to produce the fours. The product's shelf life was determined when subjected to storage (with and without exposure to light) at room temperature. Several parameters were evaluated, such as colour; water activity; moisture, ash and fat contents; total phenols (TP); antioxidant activity percentage of DPPH radical scavenging activity; oxidative stability - peroxide value (PV) and ultraviolet spectrophotometry analysis (extinction coefficients (K) at 232 and 268 nm); and sensory analysis, over 0, 1, 2 and 3 months. For each condition, three independent samples were always analysed. Water activity varied between 0.110 and 0.369, having increased over time. The moisture content rose from the beginning to one month. The TP varied between 221 and 1015 mg gallic acid/kg of oil, with no defined trend. No significant differences were detected among the samples for the percentage of DPPH radical scavenging activity and PV. However, this parameter increased over time, indicating the occurrence of oxidation. No significant changes on K232 and K268 values were observed over time and among samples. Regarding the sensory analysis, until one month, the samples presented a reasonable overall assessment, while after one and two months, the samples had an intense rancid smell. Thus, it was concluded that the storage time had a more significant effect than light on the quality of the flours and the shelf life was about one month.

Keywords: Table olives; Innovation; Physic-chemical characterization; Oxidative stability; Valorization

Askri, F., Pereira, E. L., Correia, P., Lema, F., Martins, F., Ouesleti, S., Droga, R., Ramalhosa, E. (2021). Effect of using microperforated bags on the storage of chestnut (Castanea sativa Mill.) for six months. *Millenium, 2*(ed espec nº8), 73-73.

EFFECT OF USING MICROPERFORATED BAGS ON THE STORAGE OF CHESTNUT (CASTANEA SATIVA MILL.) FOR SIX MONTHS

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Chestnuts are very consumed worldwide; however, it is a perishable product that loses weight and spoils quickly. So, it is crucial to find methods to reduce economic losses. Thus, the purpose of the present work was to study the effect of using micro-perforated bags (MP-bags) in long-storage of chestnuts in refrigerated industrial chambers for 1, 2, 3 and 6 months. The weight loss, colour, texture, water activity (aw), moisture content, titratable acidity (TA), total soluble solids (TSS), reducing sugars, starch, amylose, and microbiological analysis were determined.

No significant differences were noted in the colour of the chestnut kernel between the MP-bags and the control (unpackaged chestnuts) in most situations. After six months, the weight loss was much lower in MP-bags (1.9%) than in control (23%), and a significant difference in moisture content was observed between both conditions (55.2 and 42.7%, respectively). After six months, TA and TSS varied between packages, while the starch did not. The packaging type and storage time significantly influenced the reducing sugars. The highest values were observed in control. Some variability, without a definite trend in the MP-bags, was observed along the storage period. In control, the contents of reducing sugars increased from 0.09 to 2.06 g glucose/100 g d.m.. No significant differences in aerobic mesophilic and moulds and yeasts were observed for the control and MP-bags at the end of storage. MP-bags demonstrated to be a promising solution for extending the shelf-life of chestnuts by preserving the nutritional quality of the fruits.

Keywords: Chestnuts; Shelf-life; Packaging; Physic-chemical parameters; Microbial counts

Naibaho, J., Butula, N., Jonuzi, E., Figiel, A., Yang, B., Föste, M., Laaksonen, O., Kütt, M., Korzeniowska, M. (2021). Brewers' spent grain (BSG) as a functional food ingredient in yogurt production: the impact of particle size of BSG in yogurt. *Millenium, 2*(ed espec nº8), 74-74.

BREWERS' SPENT GRAIN (BSG) AS A FUNCTIONAL FOOD INGREDIENT IN YOGURT PRODUCTION: THE IMPACT OF PARTICLE SIZE OF BSG IN YOGURT

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BSG has been reported for its potential ingredient in a functional food. BSG contains high dietary fiber, which has ability to absorb water up to tenfold thus solidifying the food mixture. Therefore, it is promising as a texturizer in yogurt besides that the dietary fiber of BSG is beneficial for gut health. This study aims to evaluate the impact of BSG in yogurt properties including physical and microbial properties. An amount of 10% of BSG in different particle sizes, 150, 250 and 385 µm, was added in yogurt fermentation and the evaluation was carried out after 14 days of storage.

The results showed that the increase in particle size of BSG generated a higher viscosity and shear stress of yogurt. However, it had no impact on shear rate, young modulus and storage modulus of yogurt. Smaller BSG particle size reduced the lightness of yogurt. BSG-added yogurt with particle size 150 and 385 µm generated a lower syneresis, while 250 µm produced a higher syneresis. Moreover, the smaller the particle size of BSG, the higher the pH and amount of lactic acid. The addition of BSG with 150 µm particles generated a higher growth of Lactobacillus bulgaricus, but lower amount of Streptococcus thermophilus.

In conclusion, BSG is able to increase the quality of yogurt considering particle size affects the physical and microbial properties of yogurt.

Keywords: Valorization; Agro-industrial byproduct; Dairy products; Food sustainability; Sustainable production

Boustani, N. M., Guiné, R. (2021). Food knowledge and eating habits in a developing country: Case of Lebanese consumers. *Millenium, 2*(ed espec nº8), 75-75.

FOOD KNOWLEDGE AND EATING HABITS IN A DEVELOPING COUNTRY: CASE OF LEBANESE CONSUMERS

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This study investigated the Lebanese consumers' knowledge about food fibre and their food habits according to age groups and gender and it was conducted from January 2021 till end of March 2021. Due to the pandemic of Covid-19 and the lockdown, the questionnaire was administered randomly through social media. The survey consisted of a longitudinal study undertaken on a sample of 273 participants from which only 258 questionnaires were considered valid. A quantitative, transversal, descriptive and analytical study was undertaken, with a non-probabilistic convenience sample of 258 respondents mostly females (59.7%) and mostly living in an urban environment (78.3%). For the analysis of the data, basic descriptive statistics was used, complemented with statistical tests (Student t test for comparisons between two groups). Finally, results and analysis were done to evaluate the importance of food knowledge among these people in addition to their eating habits and the possible gender differences. The results revealed that there are some gender inequalities ($F=6.238$, $\alpha= 0.0013$) in terms of knowledge about food fibres but no living environment differences when it comes to this variable ($F=0.36$, $\alpha=0.85$) While consumption habits showed major differences between female and male food behaviour specially when it comes to eating: the frequency of eating outside from home, eating fast food and consuming fruits. The importance of this work resided in the highlight of the food knowledge and habits in Lebanon specifically in a country defined by a multi-ethnical diversity and religiosity and where food habits were mainly related to social behaviour, therefore this study add more knowledge about these people food behaviour and add more data to specific types of food attitude.

Keywords: Lebanese consumers; Eating habits; Food knowledge; Fast food; Food fiber

Ferreira, L. S., Carvalho, A. B.,Leitão, E., Silva, A. M., Barroca, M. J. (2021). Antioxidant properties of Corema album (L.) D. Don extracts. *Millenium, 2*(ed espec nº8), 76-76.

ANTIOXIDANT PROPERTIES OF COREMA ALBUM (L.) D. DON EXTRACTS

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Corema album is an endemic maritime plant of the Iberian Peninsula that can be found in sandy dunes along the maritime coast. The shrub and its white berries, white crowberries, have long been known for being a source of nutrients. They are distinct from other berries because of their colour and acidic taste, however they are not currently commercially exploited. In this study, water and methanol extracts of lyophilized berries powder and grinded leaves of Corema album were studied for determination of the content in phenolic compounds, in particular flavonoids and antioxidant activity using the DPPH free radical scavenging method.

The plant is a source of phenolic compounds and the leaves extracts are a better source of this phytochemicals than the berries extracts. DPPH radical-scavenging activity was present in both extracts and the antioxidant activity in the extracts is slightly superior. The identification and quantification of phenolic compounds by HPLC was performed. The results show that the berries extract is a better source of caffeic acid, chlorogenic acid and its isomers, 4-CQA and 5CQA, and the leaves extract is a better source of trigonelline and ferulic acid.

Keywords: Corema album; White crowberry; Extract; Phytochemicals; Antioxidant activity

Paulo, L., Moreira, M., Beato, H., Cristóvão, M., Resende, M., Rodrigues, A. M. (2021). Nutritional characterization of PDO cheeses from the central region of Portugal. *Millenium, 2*(ed espec nº8), 77-77.

NUTRITIONAL CHARACTERIZATION OF PDO CHEESES FROM THE CENTRAL REGION OF PORTUGAL

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Program for the Valorization of Cheese of Portugal's Center Region aims to contribute to the strengthening and valorization of this sector, encouraging and leveraging the market demand for Protected Designation of Origin (PDO) cheeses, of the Central Region, as a recognized differentiated quality products. "Serra da Estrela", "Amarelo da Beira Baixa" and "Rabaçal" PDO cheeses, are evidenced as one of the main endogenous products of the territory, as well as those that have the greatest potential for growth and boosting other activities. In this work, the nutritional composition (moisture/dry extract, protein, lipids/fatty acid profile, ash, carbohydrates, caloric value and sodium/salt) of traditional Portuguese PDO cheeses, "Serra da Estrela" (n=23), "Amarelo da Beira Baixa" (n=19) and "Rabaçal" (n=11) was performed. The results show that the "Rabaçal" cheese as higher ($p \leq 0.05$) dry extract (62.38±3.68%), protein (23.25±1.28%), lipids (31.66±2.95%), ash (4.19±0.40%), carbohydrates (3.27±1.03%) and caloric value (391.06 ±28.45 kcal.100g-1) when compared to "Serra da Estrela" and "Amarelo da Beira Baixa" cheeses. However "Amarelo da Beira Baixa" has slightly higher salt contents (2.14 ±0.35%). Such values can be justified, considering that the salt content varies according to the cheesemaker. Regarding the fatty acid profile "Rabaçal" cheese presented the highest percentage of saturated and polyunsaturated fatty acids. The results demonstrated that differences between samples of the three types of cheese may be related to the variety and proportion of milk types used in the manufacture of cheese (only sheep or mixture of sheep and goat), ripening conditions, salt content and manufacturing process.

Keywords: "Serra da Estrela" cheese; "Amarelo da Beira Baixa" cheese; "Rabaçal" cheese; protected designation of origin (PDO); Fatty acids profile

Acknowledgments: Program for the Valorization of Cheese of Portugal´s Center Region, co-financed by the Centro 2020, Portugal 2020, and the European Union through the ERDF. Project code: CENTRO 04-3928-FEDER-000014

Oliveira, M., Ribeiro, R., Caio, S., Ferreira, A., Ferreira, J. (2021). Carbon footprint of juice produced from cold-pressed locally grown fruit. *Millenium, 2*(ed espec nº8), 78-78.

CARBON FOOTPRINT OF JUICE PRODUCED FROM COLD-PRESSED LOCALLY GROWN FRUIT

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The food and drinks industry is a major contributor to greenhouse gas emissions (GHG) in Europe. Identifying GHG emission hotspots in this economic sector is thus key to tackle the Climate Action goal of the 2030 United Nations Agenda for Sustainable Development. Life Cycle Assessment (LCA) is a recognized tool to measure the carbon footprint of products through their life cycle.

The objectives of this work were to calculate the organizational carbon footprint of a fruit juice factory located in the Portuguese Centro region and identify hotspots. The company produced 62,000 liters of cold-pressed juice without additives in 2020, from diverse fruits and vegetables (apple, pear, carrot, plum, apricot, peach, strawberry, cherry, kiwi and blueberry). Most fruit was grown within a 30 km radius. Diesel was used for heating in the juice pasteurizer. Pressed fruit pomace was used for animal feeding, and fruit pits disposed in landfill. A Craddle-to-gate LCA was conducted using the IPCC 2013 GWP 100a method and the Ecoinvent database.

The carbon footprint over a year of manufacturing was estimated at 76,676 kg CO2 eq, i.e., 1.24 kg CO2 eq per liter of juice. The hotspots for GHG were the transportation of raw materials (15.5% of total carbon footprint), cultivation of pears (13.9%) and apples (10.9%), production of electricity (12.6%), and deposition of solid waste (fruit pits) in landfill (11.0%).

We conclude that a reduction of 16.0% in the carbon footprint can be achieved if fruit pits are used as biofuel in the pasteurizer instead of diesel.

Keywords: Circular economy; Sustainable development; Climate change mitigation; Life-cycle analysis; Agricultural waste

Andrade, L. P., Veloso, A., Santo, C. E., Gaspar, P. D., Silva, P. D., Resende, M., Beato, H., Baptista, C., Pintado, C. M., Paulo, L., Simões, M. P. (2021). Effect of controlled atmospheres and environmental conditions in the physicochemical and sensory characteristics of sweet cherry cultivar Satin. *Millenium, 2*(ed espec nº8), 79-79.

EFFECT OF CONTROLLED ATMOSPHERES AND ENVIRONMENTAL CONDITIONS IN THE PHYSICOCHEMICAL AND SENSORY CHARACTERISTICS OF SWEET CHERRY CULTIVAR SATIN

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Sweet cherry is a highly appreciated seasonal fruit with a high content of bioactive compounds, however this highly perishable fruit has a relatively short shelf-life period. Here, we evaluated the evolution of physicochemical and sensory quality of sweet cherries (Prunus avium (L.) cv. Satin) under different storage conditions, namely: at Farmers' Organization (FO) and in a Research Centre (RC) chamber under normal and controlled atmosphere conditions for 49 days. Additional parameters were monitored such as rotten fruits incidence and stem visual aspect throughout. The temperature was the factor that influenced the most the fruit quality evolution over the study time. In fact, fruits stored at higher mean temperatures showed higher weight losses, higher variation in CIE-Lab colour parameters, higher firmness loss, browner and more dehydrated stems and were less appealing to the consumer. Controlled atmosphere conditions showed a lower decrease in CIE-Lab colour parameters and lower weight losses. The incidence of rotting was very low and was always equal or lower than 2% for all conditions. Thus, RC chamber conditions were able to sustain fruit quality parameters over 28 days under normal atmosphere conditions and 49 days under controlled atmosphere conditions.

Keywords: Carbon Dioxide; Controlled Atmosphere; Refrigeration; Sensory Evaluation; Sweet Cherry

Korzeniowska, M., Naibaho, J., Waiss, M. (2021). Optimization of the burgers quality by the addition of barley spent grains. *Millenium, 2*(ed espec nº8), 80-80.

OPTIMIZATION OF THE BURGERS QUALITY BY THE ADDITION OF BARLEY SPENT GRAINS

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Brewing industry is now the most dynamically developing and expanding food production sector in the world. Increasing number of breweries rises the volume of barley spent grains (BSG), main side-stream material in beer production. Rich in fiber, phenolics, vitamins and minerals BSG, is a valuable material for further usage, but only when quickly preserved to avoid microbial spoilage. BSG utilization in meat processing and creation of a popular burger-type product can be an innovative and future-proof solution. The combination of a fiber-rich material with meat can result in a better quality and sensory performance and increased healthiness of products. The objective of this work was to design and optimize a high quality burger type product prepared from chicken meat and BSG stabilized by drying. The addition of BSG to burger's composition had a positive effect on organoleptic properties, as well as on product stability and quality was maintained during storage. The application of BSG to meat burgers processing increased the hardness and fatness of the final products, but reduced juiciness, lightness (L value), pH, and weight loss. Innovative burgers were also characterized by higher storage stability, especially in case of limitation of oxidative changes by BSG addition. Optimization of the barley spent grains addition to the innovative convenient chicken meat products is limited to 4% due to substantial quality changes.

Keywords: Burgers; BSG; Quality; Innovative convenient foods

Pires, A., Pires, A., Ressurreição, S. Marques, J., Barroca, M. J., Silva, A. M. (2021). Sea purslane as emerging food crop: nutritional and biological studies. *Millenium, 2*(ed espec nº8), 81-81.

SEA PURSLANE AS EMERGING FOOD CROP: NUTRITIONAL AND BIOLOGICAL STUDIES

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Halophyte plants are extremely adapted to salt marsh ecosystems due to their physiological and ecological characteristics. Halimione portulacoides (L.) Aellen is one abundant halophyte shrub that belongs to a Chenopodiaceae family and Caryophyllales order, found on sandy and muddy coastlines and salt marshes.

In this study, the aerial part of sea purslane (H. portulacoides) was characterized at nutritional and mineral levels. From a nutritional point of view, this halophyte plant may be considered as a good source of alimentary fiber, proteins and natural minerals such as calcium, potassium and sodium. Furthermore, the main sugar found in aerial parts of sea purslane is maltose followed by sucrose, glucose, and fructose.

The nutritional profile and its resistance to different environmental stresses highlight H. portulacoides as a good candidate for exploitation in saline agriculture and to be used as a new vegetable, especially as a premium food in the novel “salty veggies” market.

Keywords: Halophyte; Sea purslane; Nutritional; Mineral content; Novel food

Cunha, S. A., Nova, P., Barros, D., Ramos, C., Castro, I., Vaz-Velho, M., Gomes, A., Pintado, M. (2021). Extracts from Marine Origin as Functional Ingredients to Improve the Antioxidant Activity of Horse Mackerel (Trachurus trachurus). *Millenium, 2*(ed espec nº8), 82-82.

EXTRACTS FROM MARINE ORIGIN AS FUNCTIONAL INGREDIENTS TO IMPROVE THE ANTIOXIDANT ACTIVITY OF HORSE MACKEREL (TRACHURUS TRACHURUS)

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Marine species have been largely described as a source of antioxidant extracts. The production of antioxidant extracts from microalgae and mussels may be an interesting sustainable approach for food industry, since microalgae are easy to produce, and mussel's commercialization generates losses and waste. Thus, this work studied the effect of three marine extracts, produced from Tetraselmis sp. and Mytilus galloprovincialis, on the antioxidant activity of Horse Mackerel fillets (HMF), with the goal of developing functional ingredients for food industry.

Three extracts were produced by enzymatic hydrolysis: Tetraselmis (cellulase and subtilisin), Mussel_Sub (subtilisin) and Mussel_Pro+Alc (Protamex and Alcalase). All the extracts were ultra-filtrated using a 3KDa cut-off. HMF were evenly sprayed with each extract, and a control without extract was used. Aqueous extracts were prepared from HMF by sonication. The antioxidant activity was determined by ORAC and ABTS assays.

The results obtained for the ORAC were 15.2±3.0, 45.2±1.8, 37.6±2.6 and 20±5.0 µM Trolox Equivalent (TE)/g of sample, and the ABTS activity was 6.5±0.2, 12.9±0.6, 8.5±0.1, and 14.0±0.4 µM TE/g of sample for control, Tetraselmis, Mussel_Sub and Mussel_Pro+Alc, respectively. Fillet sprayed with Tetraselmis extract presented statistically significant differences for ORAC and ABTS results (three and two-fold), and Mussel_Pro+Alc for ABTS results (two-fold), when compared to control fillets ($p<0.05$).

The marine extracts application enhanced the antioxidant activity of the HMF, with Tetraselmis extract showing the higher potential in both antioxidant assays, thus it may be promising as an ingredient for the development of functional food aiming preservation properties as well as health promotion.

Keywords: Sustainability; Functional food; Enzymatic hydrolysis; Marine species; Bioactive extracts

Araújo-Rodrigues, H., Campos, D. A., Rodrigues, I., Pintado, M. (2021). Effects of freezing, drying and storage period on bioactive properties of rocket leaves, spinach and watercress by-products. *Millenium, 2*(ed espec nº8), 83-83.

EFFECTS OF FREEZING, DRYING AND STORAGE PERIOD ON BIOACTIVE PROPERTIES OF ROCKET LEAVES, SPINACH AND WATERCRESS BY-PRODUCTS

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Green leafy vegetables are rich sources of bioactive metabolites, holding a high antioxidant potential and health-associated benefits in chronic, cardiovascular, neurological and some cancer diseases. The transformation of by-products from these industries into ingredients with a long shelf-life is an opportunity to reduce food losses and develop added-value products.

In this study, the impact on the bioactive properties of two processing approaches (pulps development and freezing as well as hot air drying and vacuum storage) in rocket leaves, spinach and watercress by-products were evaluated for 6 months. After washing and sodium hypochlorite disinfection, the microbial counts of all by-products significantly decreased, with no significant variations during both processing approaches and storages. The results suggested that total phenolic compounds (TPC), antioxidant capacity (ABTS, ORAC and DPPH) and carotenoid content significantly increased in the first months of freezing, but after this period decreased. In some cases, these values were higher in the final freezing period compared to fresh by-products. Although no key variations were registered during drying storage, a negative impact was registered compared to fresh vegetables, except for watercress, where no significant variations in the antioxidant capacity by DPPH method and carotenoids content were verified. α-, β-carotene and lutein were detected in spinach and rocket leaves while in watercress only β-carotene and lutein were identified. The most relevant carotenoid in all vegetables was β-carotene with higher concentrations in rocket leaves and watercress in month 3 (258.54±6.56 and 224.89±17.22 mg/100 g DM, respectively) and spinach in month 4 (231.55±5.92 mg/100 g DM).

Keywords: Rocket leaves; Spinach and watercress; By-products; Total phenolic compounds; Antioxidant capacity; Carotenoids

Cunha, S. A., Salsinha, A. S., Silva, J. L., Pintado, M. (2021). In vitro gastrointestinal digestion impact on the antioxidant activity of extracts produced from the microalgae Chlorella vulgaris and Nannochloropsis oceanica. *Millenium, 2*(ed espec nº8), 84-84.

IN VITRO GASTROINTESTINAL DIGESTION IMPACT ON THE ANTIOXIDANT ACTIVITY OF EXTRACTS PRODUCED FROM THE MICROALGAE CHLORELLA VULGARIS AND NANNOCHLOROPSIS OCEANICA

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Microalgae are rapidly cultivable growing photosynthetic organisms rich in compounds with high biological values, such as antioxidants, with interest for food industry. Although microalgae extracts may present several health benefits, it is necessary to understand if their properties are maintained throughout the gastrointestinal (GI) digestion, after the exposure to enzymes and different pH ranges. Thus, this work studied the impact of in vitro gastrointestinal digestion on the antioxidant activity of extracts produced from the microalgae Chlorella vulgaris and Nannochloropsis oceanica, with the goal of evaluating their potential as functional food ingredients.

Chlorella extract was produced by acid and enzymatic hydrolysis (cellulase and subtilisin) and Nannochloropsis extract by enzymatic hydrolysis (cellulase and subtilisin). Both were submitted to simulated GI conditions. The antioxidant activity was determined by ORAC and ABTS assays in four stages of GI simulation (before digestion, and after mouth, stomach and intestine digestion).

Both extracts showed increased ORAC and ABTS values throughout the GI digestion. This increase was statistically significant for Chlorella in terms of ABTS values in all phases, and in ORAC after stomach and intestine digestion. For Nannochloropsis, only the increase in ABTS values was statistically different after stomach and intestine digestion ($p<0.05$).

This study showed that both extracts maintain their antioxidant activity throughout in vitro GI digestion, with a little increase being observed, which may be explained by the formation of smaller and more bioactive peptides. These results shows that Chlorella and Nannochloropsis extracts may be considered sustainable antioxidant ingredients for the development of functional food.

Keywords: Bioactive extracts; Functional food; Active ingredients; Sustainable ingredients; Microalgae

Brassesco, M., Vilas-Boas, A., Brandão, T., Silva, C., Pintado, M. (2021). Chemical composition, antioxidant capacity and phenolic content of carob (Ceratonia siliqua L.) flour as related to seed presence and roasting effects. *Millenium, 2*(ed espec nº8), 85-85.

CHEMICAL COMPOSITION, ANTIOXIDANT CAPACITY AND PHENOLIC CONTENT OF CAROB (CERATONIA SILIQUA L.) FLOUR AS RELATED TO SEED PRESENCE AND ROASTING EFFECTS

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Carob is the fruit of an evergreen tree (Ceratonia siliqua L.) cultivated in the Mediterranean area, where Portugal has a high-cultivated extent with relevant production and low prices. Carob is well known for its valuable locust bean gum. However, carob pods contain various relevant nutrients, including proteins, carbohydrates and fiber, and phytochemicals such as polyphenols, which position carob flour with great potential to be used as a functional ingredient.

This study aimed to evaluate the impact of different roasting processes of carob flour (with and without seeds) on its nutritional composition and antioxidant activity. Seed presence led to a higher content of macronutrients in carob flour. The roasting processing affected the total content of polyphenols (TPC), determined by Folin-Ciocalteau, since the content at 150 ºC was twice of that obtained at 80 ºC, probably due to the formation of certain Maillard reaction products (MRPs), or certain phenolics that may degrade during roasting. The antioxidant activity is correlated with TPC, increasing when the flour was roasting at 150 ºC. Regarding the total fiber content, a significant increase was observed in samples processed at 150 ºC. These findings confirm the importance of understanding the impact of processing on the nutritional value and bioactive properties of carob flours, to use them efficiently as a functional food ingredient.

Keywords: Carob pulp; Seeds; Bioactive compounds; Antioxidant activity.

Barracosa, P., Coutinho, R., Ausquia, R., Barracosa, R., Matias, J., Oliveira, J. (2021). Biochemical diversity of cardoon flowers: Influence in the curd and whey composition. *Millenium, 2*(ed espec nº8), 86-86.

BIOCHEMICAL DIVERSITY OF CARDOON FLOWERS: INFLUENCE IN THE CURD AND WHEY COMPOSITION

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Cardoon flower extract is a vegetable coagulant used in the production of Serra da Estrela PDO cheeses that are highly appreciated, due to their typical flavor and smooth texture. Raw ewe´s milk from Serra da Estrela breed with distinct contents in fat (37.71-43.28%) and protein (30.52-32.02%) were used for the coagulation process with three distinct cardoon flowers (3M, 6M) from Cynara cardunculus and (CH) from C. humilis with specific biochemical profiles of cardosins. After the coagulation process, protein content obtained in curd, was higher with the extract obtained with genotype 3M (47.31%), followed by 6M (42.69%) and CH (39.66%). On the other hand, the fat content in curd was lower in 3M (33.47%) compared with the other genotypes (39.00%), which clearly promoted a higher fat content in whey. Genotype 3M promoted a more intense proteolytic action with smaller peptides and a more intense whey volume drainage and fat concentration. Genotype 3M revealed a slower micellar aggregation and lower gel firmness along milk coagulation, which produces a smoother texture of curd. Genotype 6M compared with others, presented the highest total concentration of cardosins (namely cardosin A) and proteolytic action and the lowest time of coagulation, which reflects in a firmer texture of the curd matrix. The specific characterization of natural biochemical diversity of cardoon flowers and their influence on cheese texture and nutritional composition seems to be of great interest since this knowledge will enable producers to predict cheese properties within a wider range of texture to fulfil consumers.

Keywords: Serra da Estrela PDO Cheese; Cynara; Physicochemical parameters; Cardosins

Acknowledgments: The authors wish to thank Programa de Desenvolvimento Rural 2014-2020 (PDR2020) under Portugal 2020 and through Fundo Europeu Agrícola de Desenvolvimento Rural (FEADER) for the financial support iCheese Project (PDR2020-101-031002).

Anjos, O., Lavado, I., Boas, M. V., Campos, M. G. (2021). Need and development of Bee Pollen Standardization. *Millenium, 2*(ed espec nº8), 87-87.

NEED AND DEVELOPMENT OF BEE POLLEN STANDARDIZATION

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The "International Standards of Quality" are a critical step for the commercialization of food products. Although their application is voluntary, they are used as references in legislation, accreditation, certification, metrology, technical information, and commercial relations processes between customers and suppliers.

Among bee products, bee pollen is an essential source of macro and micronutrients for the growth and development of bees. Due to its chemical composition, it has been explored as a food supplement for human consumption. This product is rich in proteins, lipids, free sugars, carbohydrates and contains small amounts of minerals, phenolic acids, flavonoids, and a wide variety of vitamins. Several bioactivities have been studied with promising results in pollen samples from different floral sources. The quantity and diversity of micronutrients could induce enormous health benefits after a rigorous risk assessment.

However, due to standardization and risk assessment, even with good indications that stimulate consumption, the marketed pollen products do not always have better quality.

To enhance and guarantee the quality in the near future, a specific technical committee for Bee products, ISO/TC 34/SC 19, was recently created, which includes Quality Standards, Standard Methodologies of Analysis, Rules for Storage and Transport. NormBee Project supports the Portuguese participation in all Working Groups of the ISO/TC 34/SC 19. The present work is a brief description of the standards being created in the scope cited above, emphasizing ISO/TC 34/SC 19 - WG3: Bee pollen and its importance in a globalized context.

Keywords: Pollen; ISO; Analytical procedures; Internationalization; Food security

Funding: This work is financial support by Project NormBee (PAN 2020-2022) and and Forest Research Centre (CEF) a unit funded by Fundação para a Ciência e a Tecnologia I.P. (FCT), Portugal

Ferreira, H., Pinheiro, R. (2021). Rheological, texture, colour and microbiological properties of dough and bread quality characteristics during storage under different preservation methods. *Millenium, 2*(ed espec nº8), 88-88.

RHEOLOGICAL, TEXTURE, COLOUR AND MICROBIOLOGICAL PROPERTIES OF DOUGH AND BREAD QUALITY CHARACTERISTICS DURING STORAGE UNDER DIFFERENT PRESERVATION METHODS

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Bread is the most consumed staple food around the world, especially in developing countries. Consumption of bread made from preserved dough is increasing in bakeries, supermarkets and restaurants all, due to the easiness of producing freshly baked product at any time of the day.

The aim of this work was to study the behaviour of wheat dough and bread, during storage time, under different preservation methods: partial vacuum (50%), modified atmosphere (50%CO2) and freezing (-35ºC). Samples were storage during 15 and 60 days, for vacuum and MAP, and freezing, respectively. A control with air was also made. Rheological, texture, colour, moisture, pH and microbiological properties of dough and bread were determined.

Texture results showed that hardness of bread crumb and crust increased over storage time for air, vacuum and MAP conditions. On the contrary, hardness of samples, under freezing, remained constant. There were no significant differences in moisture content during storage time, regardless of the preservation method. Concerning color results, luminosity of dough and bread crumb decreased for all conditions studied. Regarding dough viscosity, it was found that the consistency index decreased over time for all methods, being less pronounced in the case of freezing. The microbiological results showed that all parameters analyzed are in accordance with the international guidelines. It was concluded that dough bread storage under freezing conditions could be a viable solution for the industry in order extend shelf-life, while assuring consumers a quality product at any time of the day, enabling greater efficiency to the bakeries.

Keywords: Wheat bread; Preservation methods; Physicochemical properties; Microbiological analysis; Storage

Caldeira, I., Granja-Soares, J., Vitória, C., Anjos, O., Fernandes, T. A., Fargeton, L., Boissier, B., Catarino, S., Canas, S. (2021). Volatile phenols in aged wine spirits: role, contents and impact of ageing systems. *Millenium, 2*(ed espec nº8), 89-89.

VOLATILE PHENOLS IN AGED WINE SPIRITS: ROLE, CONTENTS AND IMPACT OF AGEING SYSTEMS

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The volatile phenols (eugenol, guaiacol, 4-methylguaiacol, syringol, 4-methylsyringol and 4-allylsyringol) are odorant compounds that may exist in aged wine spirits resulting from their contact with wooden barrels during the ageing process. These compounds, which are originated from wood lignin's, revealed an important sensory impact in aged wine spirits due to their low sensory thresholds and correlations with sensory attributes such as woody, toasted, smoke, which have a close relationship with the quality of these beverages. The wine spirits are traditionally aged in wooden barrels but the use of wood fragments, with or without micro-oxygenation, is a technological alternative that has been recently studied by our team with promising results. This work presents an overview of volatile phenols' amounts in wine spirits aged in wooden barrels during different ageing times and using two kinds of wood (chestnut versus oak). These compounds were quantified by GC-FID, after a previous extraction and concentration steps, and their identification was assessed by GC-MS. It is also examined the results and the impact of alternative technologies on the amounts of such compounds. The ANOVA results showed a significant effect of the ageing system and the wood botanical species on the volatile phenols contents.

Keywords: Volatile phenols; Aged spirits; Chestnut; Oak; Micro-oxygenation

Acknowledgments: The authors thank the financial support of projects Project CENTRO-04-3928-FEDER-000028 and POCI-01-0145-FEDER-027819.

Boustani, N. M., Guiné, R. (2021). How to adequately disseminate information and increase awareness about consumed products in a developing country?. *Millenium, 2*(ed espec nº8), 90-90.

HOW TO ADEQUATELY DISSEMINATE INFORMATION AND INCREASE AWARENESS ABOUT CONSUMED PRODUCTS IN A DEVELOPING COUNTRY?

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The objective of this work was to determine what could be the most adequate means to educate Lebanese people about the importance of food fibers on one hand, and the researchers tested the importance level the Lebanese consumers' give to food labelling when purchasing their products, on the other hand. For this, a survey consisted of a cross-sectional study undertaken on a sample of 273 participants from which 258 questionnaires were considered valid. For the data analysis, basic descriptive statistics was used, complemented with statistical tests (Anova, t-test). A quantitative descriptive and analytical study was undertaken, with a non-probabilistic sample of respondents living in an urban environment (78.3%). The results showed that radio was ranked as first tool where people find information about food (29.1%), followed by hospitals (23.3%), and people consider that these are the most appropriate places and means to communicate information (28.3% and 22.5%, respectively). Furthermore, the authors shed the lights on the importance of food labelling among these consumers' when they intend to buy their products, first the variable reliability was tested (α=0.847) and the results showed that Lebanese behaviour about nutrition labelling is quiet interesting since a big majority 73.3% are used to check the labels but on the other hand 56.6% aren't interested in the components and the fibres it possesses. Finally, sociodemographic differences in variables were evaluated in terms of gender using independent sample T-test. The results revealed that there are some gender and statistical differences related to the impact of food labelling between males and females (F=207, α=0.649) and for consumers who check food labelling and their knowledge about food components (α=0.047).

Keywords: Lebanese consumers; Eating habits; Food knowledge; Means of dissemination; Food labelling

Pires, P., Mendonça, A., Estevinho, M. L., Anjos, O., Guiné, R. (2021). Plant-Based Beverage: Perceptions and Beliefs on Portuguese Population. *Millenium, 2*(ed espec nº8), 91-91.

PLANT-BASED BEVERAGE: PERCEPTIONS AND BELIEFS ON PORTUGUESE POPULATION

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The objective of this study was to understand how Portuguese consumers perceive vegetable beverages and whether they consume or will be willing to consume in the future this type of product. Therefore, a market research has performed, through a questionnaire survey performed online. A total of 886 valid responses were considered.

The results show that almond vegetable drink had the highest preference followed by oat and soya drinks. Furthermore, the responses showed a good perception about plant-based beverages consumption's in general (48.2% of women and 45.1% of men had correct perceptions). There were no statistically significant differences between male and female responses, regarding the perceptions. However, the Portuguese population presented a lack of knowledge about some aspects of plant-beverages production, health benefits or nutritional values, according with age and professional area (health, nutrition or agriculture).

This survey showed different perspectives about some key points for the acceptance and consumption of this type of beverage, and which include possible health problems that might limit the consumption of milk based products or individual choices to opt for consumption of less products of animal origin, with a view for sustainability. Results suggest that industry should target a better nutritional supplementation of these products, as well as the organoleptic characteristics that may impact their acceptance. Additionally, information is also a key factor to improve consumer shifting to adoption of this alternative vegetable-based drinks.

Keywords: Plant-based; beverages; Beliefs; Consumers; Perceptions

Neves, C., Pinto, A., Gonçalves, F., Wessel, D. (2021). Effect of thermal treatment on anthocyanins profile in elderberry (Sambucus nigra L.) juice concentrate. *Millenium, 2*(ed espec nº8), 92-92.

EFFECT OF THERMAL TREATMENT ON ANTHOCYANINS PROFILE IN ELDERBERRY (SAMBUCUS NIGRA L.) JUICE CONCENTRATE

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Sambucus nigra L., commonly known as elderberry, is a widespread shrub in Europe and North Africa. Its fruits are rich in phenolic compounds, mainly anthocyanins, flavonols, and hydroxycinnamic acids [1]. Due to the presence of these compounds, elderberry fruits are characterized by high antioxidant activity [2]. Several studies have shown that S. nigra berries exhibit anti-inflammatory, antiviral, anti-proliferative, anti-diabetic, and immunostimulatory activities [3]. The health-promoting properties of this fruit and its high content of anthocyanin pigments make it attractive for food and pharmaceutical applications [3].
To ensure microbial safety and acceptable shelf-life juices, thermal treatments are commonly applied during juice processing, which could affect the content of anthocyanins [4]. This may influence the consumer acceptance, product quality, and its potential health effects.

The purpose of this study was to evaluate the effect of an industrial thermal treatment step on phenolic composition and antioxidant capacity of elderberry concentrated juice. The concentrate with thermal treatment showed lower content of total monomeric anthocyanins (14.1±0.2g cyanidin-3-glucoside/kg) than the one obtained without treatment (15.8±0.4g cyanidin-3-glucoside/kg). Cyanidin-3-sambubioside, cyanidin-3-glucoside, cyanidin-3-sambubioside-5-glucoside, and cyanidin-3,5-diglucoside were the major anthocyanins identified by HPLC-DAD, with lower contents found in the concentrate subjected to thermal treatment. The total phenolic content and the ABTS•+ antioxidant activity were less affected by heating: 52.2±0.2g GAE/kg and 456.5±3.0 mmol Trolox/kg with treatment; 54.7±1.9g GAE/kg and 455.0±19.4 mmol Trolox/kg without treatment. The results indicated that the industrial thermal step may have a major impact on anthocyanins with no substantial effect in the antioxidant capacity of elderberry concentrate.

Keywords: Elderberry; Anthocyanins; Juice processing; Antioxidant capacity

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Gonçalves, J., Guiné, R., Amoedo, C., Correia, P. (2021). Customer knowledge and behaviour on the use of food refrigerated display cabinets: A Portuguese survey. *Millenium, 2*(ed espec nº8), 93-93.

CUSTOMER KNOWLEDGE AND BEHAVIOUR ON THE USE OF FOOD REFRIGERATED DISPLAY CABINETS: A PORTUGUESE SURVEY

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This work presents a study on customer knowledge and habits regarding the use of refrigerated display cabinets (RDC). The study was carried out using a questionnaire survey available through an internet platform to Portuguese retail stores' customers. The sample consisted of 136 individuals, who voluntarily participated in the study. The questionnaire included questions to characterize the customers' knowledge about RDC, as well as to characterize their behaviour on the use of open and closed food RDC. Other questions included the characterization of the sociodemographic population involved. The results seem to indicate that customers prefer closed RDC, and we can deduce that the existence of doors doesn´t appear to be an obstacle to purchasing food products. Results also indicate that Portuguese customers are quite well-informed about food safety issues and seem to follow assertive attitudes when they purchase food products from RDC. This study reenforces the benefits of replacing open RDC by closed glass-doors allowing significant energy savings. However, for good visibility of the products, no formation of glass fogging must be assured.

Keywords: Refrigerated display cabinets; Supermarkets; Consumer habits; Efficient energy use; Safety food

Pintado, C. M., Resende, A. M., Silveira, A., Beato, H., Dias, J., Cristóvão, M., Riscado, A., Paulo, L., Rodrigues, A. M. (2021). Assessment of raw sheep milk quality used in the production of protected designation of origin cheeses in the center region of portugal. *Millenium, 2*(ed espec nº8), 94-94.

ASSESSMENT OF RAW SHEEP MILK QUALITY USED IN THE PRODUCTION OF PROTECTED DESIGNATION OF ORIGIN CHEESES IN THE CENTER REGION OF PORTUGAL

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Portugal has a strong tradition of regional cheesemaking, being produced in the Center region three Protected Designation of Origin (PDO) raw milk cheeses: Serra da Estrela, Beira Baixa (Castelo Branco, Amarelo, and Picante), and Rabaçal. Serra da Estrela cheese is produced with raw sheep milk and coagulated via plant rennet (Cynara cardunculus L.), whereas Beira Baixa–Amarelo, Beira Baixa-Picante and Rabaçal are produced with mixtures of raw ovine and goat milks and coagulated via animal rennet. The milk for Serra da Estrela PDO cheese is exclusively from Bordaleira Serra da Estrela or Churra Mondegueira native breeds, while the milk for Beira Baixa–Amarelo and Rabaçal PDO cheeses production is from crossbreed sheep breeds. The purpose of this study was to evaluate the quality of raw sheep milk used to produce PDO cheeses on this region, regarding chemical composition and total viable count of mesophilic microrganisms. For that, a total of 362 raw milk samples were collected from 14 farms, fortnightly, from February 2019 to Abril 2021. The results showed that milk for Serra da Estrela cheese production presented higher contents ($p \leq 0,05$) of protein (6.14% ±0.46), fat (7.68% ±1.06), solids-not-fat (11.76% ±0.45) and total solids (19.34% ±1.35) than milk used to produce Beira Baixa-Amarelo and Rabaçal PDO cheeses, this one with higher lactose content ($p \leq 0,05$) (4.82% ±0.11). From a microbiological point of view, the total viable count of the milk from Rabaçal region was the lowest ($p \leq 0,05$) mean value (4,72±0.49 log CFU mL−1) and 78% of the total samples were of satisfactory quality.

Keywords: Serra da Estrela PDO cheese; Beira Baixa PDO cheese; Rabaçal PDO cheese; Chemical composition; Microbiological quality

Acknowledgements: Program for the Valorization of Cheese of Portugal´s Center Region, co-financed by the Centro 2020, Portugal 2020, and the European Union through the ERDF. Project code: CENTRO 04-3928-FEDER-000014

Pintado, C. M., Baptista, C., Marques, L., Valente, J. (2021). An innovative and nutritionally balanced breakfast kit developed for Millennials Generation: Sensory analysis by consumer. *Millenium, 2*(ed espec nº8), 95-95.

AN INNOVATIVE AND NUTRITIONALLY BALANCED BREAKFAST KIT DEVELOPED FOR MILLENNIALS GENERATION: SENSORY ANALYSIS BY CONSUMERS

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Sensory analysis has been placed as one of the most important methodologies to ensure final product acceptance by consumers. Nowadays, Millennials, or those who were born between the early 80s and the year 1996, are perhaps the most significant demographic when it comes to marketing and product development. In spite of being particularly conscious of the impact of food behaviour and food choices on health, this group is extremely vulnerable to dietary imbalance. Thus, an innovative and nutritionally balanced breakfast kit was developed and herein analysed by Millennials Generation consumers. The breakfast kit included a protein cereal bar with orange fruit, a cheese with fruit preparation and a beverage based on oat, whey and mocha (without added sugar). Eighty untrained panellists assessed sensory acceptance (appearance, flavour, texture, and overall impression), using a 9-point hedonic scale. The mean acceptance scores were between 5.3 (flavour of the beverage) and 7.6 (cheese overall impression), indicating that consumers were indifferent to some food items and very fond of others. Regarding the overall liking, the majority of the consumers scored positively (>5 points) the cheese portion (93.8%) and the cereal bar (96.3%), whereas the beverage obtained fewer positive answers (63.8%). In conclusion, the components of the new nutritionally balanced breakfast kit were sensorially accepted by the Millennials Generation consumers.

Keywords: sensory; Appearance; Flavor; Texture; Overall impression

Acknowledgements: MOBFOOD Mobilizing scientific and technological knowledge in response to the challenges of the agri-food market. This project was co-funded by COMPETE2020, Lisboa2020, Portugal2020 and European Union through the European Regional Development Fund.

Fogeiro, É., Anjos, O., Barracosa, P., Oliveira, J., Wessel, D. (2021). The impact of cardoon flower (Cynara cardunculus L.) on the physicochemical attributes of Serra da Estrela PDO cheese over two years of production. *Millenium, 2*(ed espec nº8), 96-96.

THE IMPACT OF CARDOON FLOWER (CYNARA CARDUNCULUS L.) ON THE PHYSICOCHEMICAL ATTRIBUTES OF SERRA DA ESTRELA PDO CHEESE OVER TWO YEARS OF PRODUCTION

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Serra da Estrela(SE) cheese is a traditional agri-food product with Protected Designation of Origin(PDO), manufactured at the farm level from raw ewe's milk, with salt, and coagulated with cardoon flower(Cynara cardunculus L.). Cardoon flower takes part in proteolysis at coagulation and maturation phases, helping to shape the characteristics of the final product[1]. The purpose of the present work was to evaluate the impact of two different cardoon flowers—one with a known cardosin profile, 3M[2], and the commercial one used in the cheese factory—on the physicochemical attributes of PDO SE cheese over consecutive years of production. The cheese was manufactured by a certified cheese producer according to their regular manufacture procedure, in three moments (early winter, late winter and spring) along two production years(2018/2019 and 2020/2021). The attributes analysed were cheese nutritional composition: moisture, protein and fat content; and texture profile: hardness, springiness, cohesiveness and resilience. Independent-samples t-tests were conducted to compare each of the studied attributes in cheeses produced with 3M and commercial cardoon. Cheeses produced in the same conditions but with different cardoon flowers present distinct characteristics regarding the parameters considered in this study. Fat, protein, hardness, cohesiveness and resilience show significant differences($p<0.05$) in most of the production seasons studied, while cardoon influence in the remaining characteristics is less expressive. It is evident that the way cardoon flower influences cheese characteristics depends on the production season. This work highlights the impact that the cardoon flower ecotype carries on PDO SE cheese final attributes.

Keywords: Serra da Estrela PDO Cheese; Cynara cardunculus L.; Texture; Nutritional Parameters

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Lima, M. J., R., Fontes, L., Santos, A. O., Falcão, S., Veloso, A. C. A., Peres, A. M. (2021). Serra da Estrela portuguese cheese: A valuable protein source. *Millenium, 2*(ed espec nº8), 97-97.

SERRA DA ESTRELA PORTUGUESE CHEESE: A VALUABLE PROTEIN SOURCE

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Scientific studies provide evidence that intake of protein from certain animal-based foods such as cheese is associated with a lower risk for developing chronic non-communicable diseases. Considering the supply of cheese protein in the diet, special attention should be paid to the supply of amino acids namely the supply of essential and branched-chain amino acids (BCAAS) (leucine, isoleucine and valine). Considering that Serra da Estrela (SE) Portuguese cheese contains a high percentage of protein (21.7 ± 1.16 %) the possibility of studying the free amino acid composition of SE becomes stimulating. Thus the aim of our study was to evaluate the free amino acid content of SEPC. In order to attain the proposed goal the chromatographic profiles of free amino acids in twenty four cheeses (45 days of maturation produced from November 2017 to March 2018) were established by UPLC-DAD-MS/MS. Our results showed that leucine, isoleucine, phenylalanine and serine were the most abundant essential free amino acids and cysteine, proline and asparagine were the most abundant non-essential free amino acids. The BCAAS content were also important namely valine (9.1 ± 5.1 mg/100g of cheese, wb). Since amino acids play important beneficial effects not only in improving immune response but also in the delaying aging, the Serra da Estrela might be considered a valuable protein source.

Keywords: Serra da Estrela cheese; Amino acids; Nutritional properties; Quality aa; Health

Gonçalves, A., Teixeira-Lemos, E., Guiné, R. (2021). Breakfast consumption habits in a sample of Portuguese adults. *Millenium, 2*(ed espec nº8), 98-98.

BREAKFAST CONSUMPTION HABITS IN A SAMPLE OF PORTUGUESE ADULTS

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Traditionally, breakfast has been considered the most important meal of the day. Although breakfast habits and their consequences on health and performance are documented in children, studies in the adult population are still lacking. This study aimed to evaluate breakfast consumption habits in a sample of Portuguese adults, to understand its importance and the reasons that lead people to eat or not to eat this meal.

A questionnaire study was carried out, which was disseminated via the Internet, and in which only people over 18 years old participated. The sample consisted of 105 participants, mostly young adults (51.4%).

The results show that the majority consumes breakfast every day (71.4%) and it is also verified that almost all consume this meal at home (89.7%). The results also demonstrate that the reasons invoked by the participants who do not have breakfast are mainly related to lack of time (44.0%) and the fact that they are unable to eat in the morning (48.0%). The most consumed drink is coffee (39.8%) or milk with coffee (37.8%) and accompanies toast (41.1%) or bread (white - 32.6%, wholegrain - 32.6%), with cheese, ham, butter with salt or cream vegetable.

In general, the habits observed in this study confirmed that the importance of eating breakfast is well instilled in the participants, and the three recommended basic components: cereals, dairy products and fruit, are part of this meal for more than half of the respondents.

Keywords: Breakfast; Consumption habits; Nutrition; Attitudes; Health

Gonçalves, A., Teixeira-Lemos, E., Guiné, R. (2021). Exploratory study on meat consumption habits in a sample of the Portuguese population. *Millenium, 2*(ed espec nº8), 99-99.

EXPLORATORY STUDY ON MEAT CONSUMPTION HABITS IN A SAMPLE OF THE PORTUGUESE POPULATION

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Currently, meat is one of the most consumed food products by the Portuguese population (119 kg / inhabitant / year). It is a food rich in proteins of high biological value and provides group B vitamins and minerals such as iron, potassium, phosphorus and zinc with high bioavailability and whose absorption is higher than that obtained with foods of plant origin. Its inclusion in the diet in moderate amounts helps to cover the daily needs of macro and micronutrients and offers benefits in deprived conditions.

The present work aims to characterize the meat consumption habits in a sample of the Portuguese population.

This is a quantitative investigation. The data were collected through a questionnaire, developed for the study. This investigation has an exploratory nature, and was carried out on a sample of 100 adults, recruited through computerized means (email and social networks), and the questionnaire was made available to fill in the google forms.

The sample was constituted by young (38±17 years old) mostly women (66%), single (50%), with a high level of education (secondary and higher), practiced exercise at least 2 times/week. In the studied sample all consume meat, the most consumed being chicken (38%), pork (32%), turkey (26%) and beef (23%). It is also found that horse meat is the least consumed (76% never consume). It was also found that the price is not one of the main obstacles to the purchase of meat, the aspect being the most important attribute when buying it.

In conclusion, the present study made it possible to evaluate meat consumption habits in a young population.

Keywords: Meat; Consumption habits; Questionnaire study

Tavares, F., Teixeira-Lemos, E., Guiné, R. (2021). Evaluation of consumers' perceptions, preferences and behaviors in relation to milk. *Millenium, 2*(ed espec nº8), 100-100.

EVALUATION OF CONSUMERS' PERCEPTIONS, PREFERENCES AND BEHAVIORS IN RELATION TO MILK

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Cow's milk is a complete food and, for those who do not have any type of lactose intolerance or allergy, it should be included in a healthy diet. However, its consumption in Portugal has been decreasing mainly in the younger population. The present study aimed to assess consumption habits, preferences and the perception of a sample of Portuguese consumers about milk.

The data were collected through a questionnaire, developed specifically for the study, and disseminated through the internet, including social networks. The filling of the instrument took place in an online tool during November/December 2020.

The sample consisted of 212 adults, with an average age of 34±14 years, mostly women (81.1%), and with a high level of education (secondary, higher and professional education - 90%). The results showed that only 68.4% consumed cow's milk and opted to buy simple semi-skimmed milk in TetraPack (80%). The daily consumption of milk is on average 250 mL for a large part of the participants (45%) and is achieved with 1 to 2 doses per day (in 36.6% of the cases) predominantly at breakfast (91.7%). Respondents prefer to add coffee to milk (60%). Regarding the knowledge and benefits of milk, the respondents showed to agree mostly with the statements regarding the richness of the nutritional composition and the calcium supply.

In conclusion, the studied population consumes 250 mL of semi-skimmed milk daily for breakfast, to which they add coffee, and understand the nutritional benefits of milk.

Keywords: Cow milk; Benefits; Consumption habits; Buying habits

Silva, A. J., Teixeira-Lemos, E., Guiné, R. (2021). Knowledge and consumption habits of vegetables and fruits among adults: Preliminary study. *Millenium, 2*(ed espec nº8), 101-101.

KNOWLEDGE AND CONSUMPTION HABITS OF VEGETABLES AND FRUITS AMONG ADULTS: PRELIMINARY STUDY

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The increase in the consumption of fruits and vegetables contributes to the prevention and control of chronic non-communicable diseases, responsible for 80% of mortality in European countries. Thus, considering its adequate consumption a challenge for public health, this study was carried out to assess the consumption habits and knowledge about these foods. This investigation has an exploratory nature, and the data were collected through a questionnaire, applied through google forms, on a sample of 257 adults, recruited through computerized means.

The studied sample was predominantly female (58.4%) aged between 18 and 30 years old (84%); singles (85%), mostly students (71%). They had a high level of education (76% higher education) and practiced physical exercise one to three times a week (70%). It was found that 95% of the participants like to consume vegetables, only 26% of the individuals consume vegetables every day, preferring to consume them raw (41%). The most consumed vegetable foods are lettuce, tomatoes, carrots and broccoli, eaten one to two times a week by 34% of the participants. Regarding fruit consumption, 89% of respondents like to consume raw fruit, but only 13% consume two or more pieces of fruit per day. Regarding knowledge about the consumption of vegetables and fruits, it was found that the participants are aware of their benefits.

In conclusion, it was observed that, although the respondents are aware of the benefits of vegetables and fruits, their consumption is below the recommendations. Thus, it is important to define new strategies to encourage the consumption of healthy foods.

Keywords: Consumption habits; Vegetables; Fruits; Chronic non-communicable diseases

Botelho, G., Mendes, A., Oliveira, A. (2021). Consumption profile of fruits, vegetables, aromatic and medicinal plants from organic agriculture. *Millenium, 2*(ed espec nº8), 102-102.

CONSUMPTION PROFILE OF FRUITS, VEGETABLES, AROMATIC AND MEDICINAL PLANTS FROM ORGANIC AGRICULTURE

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The production and consumption of organic products has been growing in Portugal. In order to know the consumption profile of organic fruits and vegetables (OFV) and organic aromatic and medicinal plants (OAMP), an online questionnaire was developed, with anonymous and voluntary participation, aimed at individuals over the age of 18, and 300 valid answers were obtained.

The most consumed organic vegetables were lettuce (93.5%), potatoes (92%), tomatoes (92%) and the fruits were orange (82.6%), lemon (82.1%) and strawberry (81, 6%). The OAMP with highest consumption frequency in fresh were: parsley (61.7%), garlic (56.3%), coriander (52.3%), and in dry were: oregano (50%), lemon balm (33%) and lemon verbena (31.3%). The main health aspects related to the consumption of OFV were the prevention of high cholesterol (71.4%), the prevention of cardiovascular diseases (69.3%), the prevention of obesity (68.3%), In the OAMP the aspects of main health concerns were the anti-inflammatory properties (67.7%), the prevention of cardiovascular diseases (62.7%), and the prevention of high cholesterol (60.2%). Regarding the level of information on the nutritional and chemical properties of OFV and OAMP, respondents consider themselves sufficiently informed, 39.3% and 40.2%, poorly informed, 12.4% and 16.9%, and insufficiently informed, 1.5% and 2.5% respectively.

The main reasons for the consumption of OFV and OAMP were the health benefit, followed by the benefits for the environment and to minimize salt consumption. The analysis of the level of knowledge about OFV and OAMP highlights the opportunity that exists to increase the food literacy about these products in order to promote higher informed consumption of population.

Keywords: Consumption profile; Organic fruits and vegetables; Organic aromatic and medicinal plants; Questionnaire; Food literacy

Martins, A., Teixeira-Lemos, E., Chaves, C., Aparício, G., Lima, M. J. R., Costa, C. A. (2021). Dietary and beverage pattern in women engage in family farming in the Centre of Portugal. *Millenium, 2*(ed espec nº8), 103-103.

DIETARY AND BEVERAGE PATTERN IN WOMEN ENGAGE IN FAMILY FARMING IN THE CENTRE OF PORTUGAL

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Women's farmers contribute with their labor and knowledge of agricultural practices and influence also the lifestyle habits of their families. However, little is known about their habits concerning diet and beverage patterns.

Objectives: The aim of the study was to assess the adherence to Mediterranean diet (MedDiet) and beverage consumption patterns of women's farmers.

Methods: Cross sectional study including women's farmers over 18 years-old living in the centre of Portugal. Self-administered questionnaires about lifestyle variables, educational achievement, and weight and height were fulfilled. For assessment of the level of adherence to the traditional MedDiet, the PREDIM questionnaire was administered (1). For beverages intake pattern evaluation, the Portuguese adaptation of the Spanish beverage intake questionnaire (2).

Results: A sample of 88 women were included, with a mean of 52.36±17.67 years-old, married (61.4%), with hight level of education (45%) and with overweight and obesity (57.9%). The most reported beverage was water, followed closely by milk and yogurts, sweetened beverages (soft drinks, fruit drinks), tea and coffee and the less consumed were alcoholic beverages. Mean adhesion score to MedDiet 8.4±2.65 (low; score <9). Older adults (over 65years-old) presented lower education but good adhesion score to MedDiet (9.21±2.53 vs 8.09±2.65, p< 0.005). Without statistically differences between beverage pattern of older adults with adults and also no statistically relations were found between beverage pattern and adhesion to MedDiet.

Conclusions: In this preliminary analysis of an ongoing study among family farming women, a healthier dietary pattern was associated with age.

Keywords: Beverage pattern; Family farming; Mediterranean Diet; Women

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EXPLORING THE ADHERENCE TO THE MEDITERRANEAN DIET OF FAMILY FARMERS LIVING IN THE CENTER OF PORTUGAL: A PRELIMINARY STUDY

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Family farming plays a critical role for the global production of food and provides food systems that contribute to healthier diet. Mediterranean diet (MD) is considered a healthy diet, influencing life expectancy, and preventing / delaying chronic non-communicable diseases. Nevertheless, little is known about farmers' food patterns.

Objective: To explore the degree of adherence to the Mediterranean diet (MD) in family farmers living in the centre of Portugal.

Method: Cross sectional study including 114 farmers (17.5% men and 82.5% women), aged between 18-96 years-old, living in central Portugal. For data collection a self-administered questionnaire was fulfilled, in which the PREDIMED Mediterranean Diet adherence questionnaire is included.

Results: The studied group presented a mean age of 52.7±1.56 years-old, an education level between the 5th and 12th grade, mostly married (70.2%). The BMI was 26.75 ± 4.13 Kg / m2, with 57.9% being overweight or obese. BMI showed differences according to sex ($p < 0.05$) and increased with age ($p < 0.05$). Farmers showed good adherence to MD (mean score 9.37 ± 0.2, good adherence ≥ 9), with no differences between sex or age ($p > 0.05$). No relationship was established between BMI and adherence to MD.

Conclusions: In this preliminary study good adherence rates to the MD are observed in family farmers; this evidence needs to be further explored as well as the putative correlations among the quality of life and the mental and physical health.

Keywords: Mediterranean diet; Family farming; Diet adherence

Vouga, B., Teixeira-Lemos, E., Chaves, C., Aparício, G., Lima, M. J. R., Costa, C. A. (2021). Consumption of potential immunomodulatory foods by family farmers living in the center of Portugal: A preliminary study. *Millenium, 2*(ed espec nº8), 105-105.

CONSUMPTION OF POTENTIAL IMMUNOMODULATORY FOODS BY FAMILY FARMERS LIVING IN THE CENTER OF PORTUGAL: A PRELIMINARY STUDY

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The immune system is related to healthy eating patterns, with a positive interaction between the intake of some nutrients, food bioactive compounds and immune response.

However, the knowledge about consumption of foods with putative effects on immunomodulation is sparce.

The aim of the present study was to assess the consumption of immunomodulator foods and the perception of health condition, among family farmers living in the centre of Portugal.

A cross sectional study was developed including 114 farmers (17.5% men and 82.5% women), aged between 18-96 years-old, living in central Portugal. For data collection, a self-administered questionnaire was fulfilled, in which the PREDIMED Mediterranean Diet adherence questionnaire was included.

The studied group presented an average age of 52.7±1.56 years-old, with secondary education (between the 5th and 12th grade), mostly married (70.2%). The BMI was 26.75 ± 4.13 Kg/m2, with 57.9% being overweight or obese. BMI showed differences according to sex ($p < 0.05$) and increased with age ($p < 0.05$). The most reported foods consumed by farmers were olive oil (57.9%); vegetables (more than 200g) (73.7%); fruits (61.4%); beans (61.4%); fish (49.1%) and nuts (28.1%). The studied population considered their health condition good or very good (67.6%). No statistical relations were found between the consumption of different foods and health condition.

Conclusions: There is a trendy demand for foods that can improve immune efficacy. In this preliminary analysis of an ongoing study among family farmers, the consumption of immunomodulatory foods is demonstrated.

Keywords: Nutrition; Family farmers; Immunomodulation, Health condition

Guiné, R., Florença, S., Correia, P., Costa, C. A., Ferreira, B. M., Anjos, O. (2021). Knowledge about sustainability of edible insects: An investigation in a sample of Portuguese citizens. *Millenium, 2*(ed espec nº8), 106-106.

KNOWLEDGE ABOUT SUSTAINABILITY OF EDIBLE INSECTS: AN INVESTIGATION IN A SAMPLE OF PORTUGUESE CITIZENS

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Edible insects are one of the alternative sources of protein under discussion as a way to help feed the world population while contributing to the stress input into the environment and natural ecosystems. However, edible insects (EI) are not easily accepted in many western societies due to cultural backgrounds and some degree of neophobia. Still, as a way to possibly introduce EI into nontraditional markets, the sustainability aspects may help shift behaviors. Hence this work investigated the degree of knowledge of the Portuguese about sustainability issues related with EI, by means of a questionnaire survey taken on a sample of 213 participants.

The results indicate that there is in global some knowledge among the surveyed people, and they are already informed about aspects such as: the lower ecological footprint of insects in relation to other meats (~89% of participants) ow the highest efficiently of EI to convert organic matter into protein (~87% of participants). Factor and cluster analysis revealed three groups of participants: C1 - people not informed about the statements presented, regardless of them being true or false; C2 - people not informed about the true true statements but who identify false information; and C3 - people well informed about the true statements but who were marginally unable to differentiate the false information.

In conclusion, as a first insight into the subject, this work highlights that Portuguese people already are aware about the possible role of EI as a more sustainable alternative to other types of meat.

Keywords: Edible insects; Sustainability; Information; Questionnaire survey

Tarcea, M., Hadmas, R., Guiné, R. (2021). Cultural profile connections with food behavior - a Romanian experience. *Millenium, 2*(ed espec nº8), 107-107.

CULTURAL PROFILE CONNECTIONS WITH FOOD BEHAVIOR - A ROMANIAN EXPERIENCE

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Background: Diet and food behavior are individual choices but conditioned by the cultural environment, social context, health status, physical activity, access to care and education level. The aim of our study was to evaluate Romanian's food behavior according to cultural profile, in order to identify health risks and to discover the proper community interventions.

Methods: We performed a study based on the evaluation of food behavior and lifestyle, along with specific cultural aspects, as part of the international project EATMOT. A survey was carried out on a sample of 821 Romanian adults, using a validated questionnaire of 26 questions, which was applied online, in 2018. Participation was voluntary and all ethical issues were obeyed in data collection.

Results: The results revealed that cultural background and socioeconomic status are strong variables in Romanian's food choices and diet practices; people with low socio-economic status opt for low-price foods regardless of their quality, especially the elderly; social and marketing influence has a big impact on the food intake, especially on young adults, who perceive in a higher percentage (62.5%) meals as opportunities for socialization. Interesting that teenagers and young adults who said their parents were authoritarian about healthy food, had had later on healthy diets, more regular breakfast, and more vegetables in their menu.

Conclusion: Improving eating behavior is connected with the cultural profile of the population, also with social and economic characteristics of individuals, and consequently, educational programs have to be based on these items in order to have good outcomes.

Keywords: Food behavior; Cultural status; Health; Risk

Gonçalves, Â., Oliveira, H., Dias, M. C., Silva, A. M. S., Silva, S. (2021). Effect of graphene nanoplatelets exposure in Lactuca sativa L.. *Millenium, 2*(ed espec nº8), 108-108.

EFFECT OF GRAPHENE NANOPLATELETS EXPOSURE IN LACTUCA SATIVA L.

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The growing increase developments in nanotechnology in the last few decades, and the widespread applications has resulted in the inevitable release of nanomaterials into the environment. Plants, as sessile organisms, are highly vulnerable to putative contaminants. Thus, it is essential to understand the effect of nanomaterials on plants. The literature reveals that positive, null, or toxic effects may occur depending on several factors, such as concentration and type of the nanomaterial. This work aimed to evaluate the effects of graphene nanoplatelets (nGP) in two weeks old Lactuca sativa L. plants at concentrations of 2.5 and 25 ppm, by spraying the leaves (FA) with nGP suspensions or introducing it into the soil via irrigation (RA) as application methods. Growth related parameters, membrane permeability, water content, gas exchange and chlorophyll a fluorescence were assessed. No significant differences were observed in growth, membrane permeability and water content. Regarding gas exchanges, there was, in general, an increase in stomatal conductance and a decrease in the internal CO2 concentration in nGP exposed plants. Simultaneously, the transpiration rate increased in FA plants treated with 25 ppm. Concerning the chlorophyll a fluorescence parameters, the effective efficiency of PSII and the photochemical quenching increased in RA treated with nGP plants and the non-photochemical quenching increased in FA nGP exposed plants. Overall, nGP did not induce growth or photosynthesis impairments.

Keywords: Nanomaterials; Plant stress; Photosynthesis; Graphene

Acknowledgments: Thanks are due to FCT (Fundação para a Ciência e Tecnologia)/MCTES for the financial support (UIDP/5 0017/2020+UIDB/50017/2020, UID/QUI/00062/2019, and UI0183–UID/BIA/04004/2020), through national funds. HO also acknowledges FCT for the research contract under Stimulus of Scientific Employment 2017 (CEECIND/04050/2017), and SS (SFRH/BPD/74299/2010) and MCD (SFRH/BPD/100865/2014) thank FCT for funding through program DL 57/2016

Gonçalves, Â., Silva, S., Dias, M. C., Silva, A. M. S., Oliveira, H. (2021). Graphene nanoplatelets as water stress mitigation strategy in Lactuca sativa L.. *Millenium, 2*(ed espec nº8), 109-109.

GRAPHENE NANOPLATELETS AS WATER STRESS MITIGATION STRATEGY IN LACTUCA SATIVA L.

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Plants, being primary producers, are essential for ecosystems and human society. With climate change situation, the environment has become increasingly dry, jeopardizing important sectors such as agricultural production. Therefore, it is important to solve problems like water stress. Nanomaterials, especially carbon-based, have been gaining interest in the subject due to their potential to mitigate water stress. In this work, we evaluated the potential of graphene nanoplatelets (nGP) as a water stress mitigation strategy in two weeks old Lactuca sativa L. at concentrations of 2.5 and 25 ppm, by spraying the leaves (FA) with the nGP solution or introducing it into the soil via irrigation (RA). Growth, membrane permeability, water content, gas exchange and chlorophyll a fluorescence were assessed. Differences were only detected in gas exchange and chlorophyll a fluorescence parameters. In both FA and RA plants, nGP increased the CO2 assimilation rate and stomatal conductance. Simultaneously, nGP application decreased the internal CO2 concentration in FA plants. The transpiration rate was enhanced in FA treated plants, whereas decreased in RA. Concerning the chlorophyll a fluorescence, FA stimulated the maximum efficiency of PSII. Also, in both treatments was observed a trend to increase the effective efficiency of PSII. Finally, 25 ppm application decreased the non-photochemical quenching in RA plants. Overall, the results indicate that graphene nanoplatelets enhance water stress tolerance in lettuce and could be considered in future water stress mitigation strategies.

Keywords: Nanomaterials; Water stress; Stress mitigation; Photosynthesis; Graphene

Cruz-Lopes, L. Esteves, B., Domingos, I., Ferreira, J. (2021). Chemical composition of Arbutus unedo Linnaeus. *Millenium, 2*(ed espec nº8), 110-110.

CHEMICAL COMPOSITION OF ARBUTUS UNEDO LINNAEUS

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Arbutus unedo Linnaeus, an Ericaceae commonly known as strawberry tree is a species native to the Mediterranean region. Despite having a slow growth rate, when a disturbance occurs (e.g. fire), its underground dormant buds are stimulated and the plant vigorously resprouts.

The main objective of this study was to contribute to the development of research regarding the chemical composition of different constituents of Arbutus unendo Linnaeus. The ash content was determined according to Tappi T 211 om-93. Metal cations were analyzed by ICP. The extractive content in acetone, dichloromethane and water were determined according to the Tappi T 204 om- 88. The proteins content was determined by treatment with 1% pepsin solution in 0.1 M HCl. The tannins content was assessed in extractives and proteins free stalks by reflux with 0.3%(m/v) NaOH under nitrogen atmosphere. In the determination of the lignin content, the Klason method was followed, described in TAPPI T222 om-88 standard. The cellulose content was determined by Kürscher and Höffner method.

Studies on chemical composition revealed that all materials are lignocellulosic. The external bark presents 36.3% of hemicellulose, followed by lignin 14.1% and cellulose 11.21%. For internal bark of Arbutus unedo, it consists mostly of hemicellulose 37.9%, lignin 21.9% and cellulose 16,6%. The branches are mainly composed of hemicelluloses 55.8%, extractable in water 22.5% and cellulose 55.8 %. The chemical analysis made to the cations of the ashes allowed us to conclude that they are rich in K+, Na+ and Ca2+.

Keywords: Arbutus unedo Linnaeus; Strawberry Tree; Chemical Composition; Ecovalorisation; Residues

Nova, P., Cunha, S. A., Barros, D., Ramos, C., Castro, I., Vaz-Velho, M., Pintado, M., Gomes, A. (2021). Anti-hypertensive activity of horse mackerel pulverized with three different extracts from marine origin. *Millenium, 2*(ed espec nº8), 111-111.

ANTI-HYPERTENSIVE ACTIVITY OF HORSE MACKEREL PULVERIZED WITH THREE DIFFERENT EXTRACTS FROM MARINE ORIGIN

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Hypertension is a serious risk factor and the most prevalent trigger to fatal cardiovascular diseases such as stroke and myocardial infarction. The marine environment is a unique source of molecules with biological activity such as antioxidant, anti-coagulant and anti-hypertensive activities. In this study, the anti-hypertensive activity of horse mackerel fillets (HMF) pulverized with each of the following marine extracts (derived from enzymatic hydrolysis) were determined: microalgae (Tetraselmis sp. incubated with subtilisin and cellulase), Mussel_Sub (Mytilus galloprovincialis minced and incubated with subtilisin protease) and Mussel_Pro+Alc (Mytilus galloprovincialis boiled and incubated with Protamex and Alcalase). Horse mackerel fillets were evenly sprayed with each extract and frozen until subsequent analyses. Non-sprayed HMF were used as control. Aqueous extracts were prepared from HMF by sonication. Anti-hypertensive activity was determined by the angiotensin I-converting enzyme (ACE) inhibitory activity method. Data are presented in Table.1 as average±standard deviation of two replicates.

Table 1. Anti-hypertensive activity of Horse Mackerel fillets sprayed with Extracts from Marine Origin.

Sample	ACE inhibitory activity (%)*
Control	14.4 ± 0.8a
Mussel_Sub	18.6 ± 0.6a
Microalgae	64.4 ± 4.3b
Mussel_Pro+Alc	55.7± 3.7ab

*different letters indicate significant differences ($p<0.05$) between samples

Horse mackerel fillet showed by itself an interesting anti-hypertensive profile. Notwithstanding, the tested marine-derived extracts effectively increased its biological potential(up to four-fold), with the best anti-hypertensive profile being achieved with microalgae and Mussel_Pro+Alc extracts. These extracts have an enormous potential to be used in the development of innovative food products that emphasize functionality, convenience, nutrition and health – goal of the project VALORMAR (POCI-024517-FEDER)(PPS1).

Keywords: Marine organisms; Bioactive compounds; Anti-hypertensive activity; Functional foods; Hypertension

Okpala, C., Korzeniowska, M., Guiné, R. (2021). Connecting quality of agrofood products better to consumers: Easy or difficult?. *Millenium, 2*(ed espec nº8), 112-112.

CONNECTING QUALITY OF AGROFOOD PRODUCTS BETTER TO CONSUMERS: EASY OR DIFFICULT?

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The quality of agro food products is an area in food technology that has been studied exhaustively. Despite this, quality is still yet to completely and wholly connect with consumers, given its variations. Could it be that consumers are demanding a lot more of the quality of the given agro food products? Could it be that the quality of the various products has not necessarily improved over the years?

This communication aims to reveal how easy or how difficult connecting quality appears to consumers. If it is easy, then, there should really not be any problem with quality connecting to consumers. If it is difficult, then, where is the actual problem with quality connecting to consumers. Can we offer any convincing conclusion that will alleviate consumers' concerns about quality?

Keywords: Food quality; Consumer demand; Concern; Food safety

Ferreira, A., Brito, M., Wessel, D. (2021). By-products of vegetable and aromatic herbs production: Bioactive compounds assessment and antioxidant activity evaluation. *Millenium, 2*(ed espec nº8), 113-113.

BY-PRODUCTS OF VEGETABLE AND AROMATIC HERBS PRODUCTION: BIOACTIVE COMPOUNDS ASSESSMENT AND ANTIOXIDANT ACTIVITY EVALUATION

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Between alternatives to waste are the recovery of valuable compounds with beneficial properties from the residues and the bioproduction of new added value products[1]. Phenolic compounds can be recovered from food by-products and can possess antimicrobial and antioxidant capacities[2].

The total phenolic content (TPC) adapted from Folin-Ciocalteu method[3], flavonoid content (FC) according to Alothman et al.[4] and antioxidant activity by radical ABTS+• inhibition and DPPH• free radical scavenging methods[5,6] were assessed in food by-products. The forty-two by-products analyzed were divided into three groups: leafs(14), "fleshy"(14) and aromatic herbs(14). The analysis of differences of each parameter was evaluated between the groups using the Kruskal-Wallis tests (α=5%) and the SPPS (v26) software.

The aromatic herbs group stood out with the highest mean, median, minimum and maximum in all the assays, with the exception of the flavonoids that registered the highest minimum and maximum values in the "fleshy" one. It is worth mentioning Laurus nobilis that registered the highest values in all the analyzed parameters (TPC: 21.16±0.82 mg GAE/g FW; ABTS+•: 113.49±18.47 mg trolox equivalents/g FW; DPPH•: 13.05 ± 0.82 mg ascorbic acid equivalents/g FW) and also Mentha piperita, Origanum majorana and Origanum vulgare. In terms of TPC, FC, ABTS+• and DPPH•, there are statistically significant differences between the aromatic herbs and the remaining two groups ($p<0.001$).

Despite the antioxidant potential of aromatic herbs, leaf-based horticultural by-products could be an interesting source of added-value compounds inferred by the determined values and the quantities of by-products estimated in the farmer's field.

Keywords: By-product; Valorization; Phenolic compounds; Antioxidant activity

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Florença, S., Lacerda, I., Maia, A. (2021). Food Myths: Exploratory study on a sample of Portuguese people. *Millenium, 2*(ed espec nº8), 114-114.

FOOD MYTHS: EXPLORATORY STUDY ON A SAMPLE OF PORTUGUESE PEOPLE

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Beliefs are one of the factors that influence eating behavior, arising from a set of concepts that are adopted by an individual as true. Food myths are beliefs, that is, nutritional concepts that are poorly substantiated or contradict existing scientific evidence, but which are taken as true by some people. This work intended to investigate how people perceive some facts and myths about food. For this a questionnaire survey was carried out on a sample of 503 Portuguese adults who answered the questionnaire on-line, after informed consent.

The results showed that there are some facts that people are not much sure about, such as eating the fruit before (36.8%) or after the meals (41.0%), or if the gluten-free or lactose-free foods should be generally adopted by all (26.8% and 19.5%, respectively). On the other hand, there are some wrong perceptions, like for example that you do not get fat by eating fruits and vegetables (23.1% believe this). However, in the overall the results revealed that for most of the myths and facts investigated, people have a generally good level of knowledge.

This work highlighted that despite the many wrong information that is presently available about foods and diets, people are fairly able to distinguish the true facts from the false myths.

Keywords: Food myth; Belief; Perception; Health; Balanced diet

EDUCAÇÃO E DESENVOLVIMENTO SOCIAL

EDUCATION AND SOCIAL DEVELOPMENT

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Martins, L., Fonseca, P., Hulme, W., Julian, K., Brautlacht, R. (2021). The COVID-19 pandemic as a push for digital literacy development in a Virtual Exchange Project. *Millenium, 2*(ed espec nº8), 116-116.

THE COVID-19 PANDEMIC AS A PUSH FOR DIGITAL LITERACY DEVELOPMENT IN A VIRTUAL EXCHANGE PROJECT

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The COVID-19 pandemic has had a tremendous impact on teaching and learning. Online platforms and digital tools have become crucial to keep education going. Thus, the ability to use technology effectively has become paramount, so has the need of developing global competencies to understand and analyze the impacts of a global pandemic. In a time of closed borders, Virtual Exchange projects have gained momentum, since they provide a "meaningful high-quality educational experience that allows students to interchange ideas, to reflect on the diversity of different cultures and create collaborative content with others around the globe using digital communication skills" (Consortium of Virtual Exchange 2020).

This paper reports on the ProGlobe Project and the benefits that have come out of the COVID-19 pandemic regarding a virtual exchange involving higher education students from 4 different countries. Based on the analysis of the ProGlobe evaluations from the past three years (2018, 2019 and 2020), we found out that students are more prepared than ever to participate in a virtual exchange. More importantly however, this preparedness seems to be decreasing the issues of digital competency confidence and frustrations that we have typically seen present in the past, which promotes greater student experiences and results in greater success in intended learning outcomes. Data shows evidence that even though students' awareness of skills coming into the project has been steadily increasing each year, it resulted in much higher student satisfaction and acquisition of learning outcomes in the 2020 year.

Keywords: Digital literacy; Internationalization; ICT; Pandemic; Virtual exchange

Franco, A., Figueiredo, M. (2021). Could there be learning that is not active?! Definitions, indecisions, a few provocations, and further considerations about active learning methodologies in higher education. *Millenium, 2*(ed espec nº8), 117-117.

COULD THERE BE LEARNING THAT IS NOT ACTIVE?! DEFINITIONS, INDECISIONS, A FEW PROVOCATIONS, AND FURTHER CONSIDERATIONS ABOUT ACTIVE LEARNING METHODOLOGIES IN HIGHER EDUCATION

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Active learning has been broadly proclaimed in discourses concerning higher education, nationally and internationally. Conceptual and definition issues, as well as practical issues, persist: What do we mean by "active learning"? Could there be learning that is not active? In face of its advocated relevance in the context of higher education, we propose to undertake the following in this work: (i) to explore the relevance of implementing active learning methodologies and/or strategies in the specific level of higher education; (ii) to identify and describe active learning methodologies and strategies used in higher education; and (iii) to analyze the concept(s) of active learning and discern its key-dimensions. The three goals guided a revision of published studies on active learning in higher education. We conclude our analysis by putting forward a few considerations about the critical areas in this subject, namely referring to lines of research that could contribute with evidences to clarify those who conduct research on active learning and/or implement active learning practices, and also, to strategies to support the dissemination of practices oriented towards active learning in higher education. Within this scope, from the premise that active learning is an ally of pedagogical quality in higher education, it might be crucial to accompany faculty, on the one hand, in reflecting on their pedagogical practices and, on the other hand, in taking ownership of active learning methodologies and/or strategies, for the transformation of their ways of being teachers and of practicing teaching in higher education.

Keywords: Active learning; Higher education; Pedagogical quality; Methodologies; Pedagogical practices

Melo, A. S., Maravilha, M. (2021). Artistic Project 40 plus 1: a learning proposal in the teaching of the arts of cultural performance. *Millenium, 2*(ed espec nº8), 118-118.

ARTISTIC PROJECT 40 PLUS 1: A LEARNING PROPOSAL IN THE TEACHING OF THE ARTS OF CULTURAL PERFORMANCE

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The repeated reconceptualization of teaching and learning at the various levels of education makes us emerge in a sea of reflections and search for ways to teach and learn. In a training that opens up its dynamics when learning to learn, appealing to the promotion of group work, in the integration of new knowledge in the existing one, as well as in the centrality of the student in the construction of knowledge and in the reach of diversified skills, interdisciplinary convergence assumes as an important strategy in the development and global application of innovative teaching and learning situations. The importance of training the individual as a total being is a predominant note in Art Education that through experience, emotion, expression and differentiation, seeks tools for self-knowledge betting on problem solving and the development of creativity to solve them, providing ways of adaptability to professional life.

In this communication, we intend to report the activities and learning processes development with students of the first year of the degree course in Arts of Cultural Performance, from higher education institution in the dynamization of the international artistic project that involved students of basic education and students from Poland, Slovakia and Czech Republic, as part of an Erasmus+ meeting. This consolidated different artistic areas, music, dance, visual and performing arts, culminating in a public presentation. With this communication, we intend to reflect and disseminate the potential of this learning methodology within the scope of the project carried out and the practical results.

Keywords: Higher education; Interdisciplinarity; Teaching and Learning strategies for the teaching of arts

Kriksciuniene, D., Sakalauskas, V., Luksaite, D. (2021). Fair consensus-based grading of business simulation training. *Millenium, 2*(ed espec nº8), 119-119.

FAIR CONSENSUS-BASED GRADING OF BUSINESS SIMULATION TRAINING

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Business simulation games create a motivating learning environment, as the computational complexity of business simulation games enables to reflect business decision making in the conditions of risk, competition, and strategy implementation by the individual and team efforts. However, the non-existence of a single correct answer during each unique business simulation game session makes the evaluation and grading task extremely challenging for the educators. The straightforward grading by the final win/lose result may negatively affect student motivation ignited during the game. The research literature does not provide a uniform system, therefore numerous factors and student surveys are combined for grading.

The article addresses the challenge of designing a “fair” grade which could capture the complexity of the simulation settings and maximize consensus among the educators and students about the knowledge level development demonstrated during the business simulation game.

The original method is proposed by integrating expert evaluation AHP (analytical hierarchical processing) and cognitive mapping approaches. The list of evaluation factors is elaborated by analyzing scientific research, the proposed method is developed and tested by analyzing performance data of five teams of a business simulation game course.

The research revealed the areas of differences of interpretation of business simulation performance among the educator and students. The proposed method based on AHP and cognitive mapping enabled to design the compound grade, incorporating most influential performance factors of individual and team levels for maximizing consensus of evaluating performance.

Keywords: Business simulation games; Game-based learning; Performance assessment; AHP; Cognitive mapping

Fernandes, A. C., Figueiredo, M., Matos, I. A. (2021). Children's literature and personal and social development in early childhood education. *Millenium, 2*(ed espec nº8), 120-120.

CHILDREN'S LITERATURE AND PERSONAL AND SOCIAL DEVELOPMENT IN EARLY CHILDHOOD EDUCATION

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In the Masters' Degree in Early Childhood and Primary Education, a practitioner research study was developed Early Childhood Education. The qualitative study was carried out over four months, with a group of children between three and five years-old. It aimed to articulate Children's Literature and Personal and Social Development, through the implementation and evaluation of proposals for storytelling and didactic exploration of three books. Each book was analyzed in terms of learning potential. From that analysis, and in articulation with the stories, we prepared activities associated with the concepts. The three proposals were developed in a Early Chilhood Education center. Data was collected on the involvement and emotional well-being of the children during the activities, their perspectives on the book and main concepts, as well as performance on the proposed activities. Through content analysis, we highlight the importance that books have shown to promote learning associated with the area of Personal and Social Development: i) cooperation and mutual assistance; ii) knowing how to ask for and accept help; iii) social inequalities, poverty and discrimination; iv) questions of identity and acceptance of individual characteristics. It was also possible, through the assessment of the levels of emotional well-being and envolvement, to conclude that the books and the associated didactic proposals were well received by the children, revealing levels above the minimum of quality. Children's Literature proved to be, as suggested by the authors, a significant context for promoting learning in the area of Personal and Social Development.

Keywords: Early Childhood Education; Children's Literature; Personal and Social Development; Practitioner Research

Celestino, T., Ribeiro, E., Pereira, A. (2021). The training of Physical Education teachers for inclusion: A qualitative analysis. *Millenium, 2*(ed espec nº8), 121-121.

THE TRAINING OF PHYSICAL EDUCATION TEACHERS FOR INCLUSION: A QUALITATIVE ANALYSIS

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Literature has been warning that many physical education (PE) teachers consider that they are not adequately prepared to develop processes for the inclusion of students with disabilities in classes. In this sense, it is pertinent to recover the debate on the initial training of the inclusive PE teacher, particularly at the level of organization and structuring of the curricula, with regard to the hability to intervene with students with disabilities in the training of PE teachers. Thus, the purpose of this study is to characterize the specific training within the scope of the special educational needs developed in the courses that give qualification for teaching PE. For this purpose, 3 university professors were interviewed, working in four higher education institutions (3 state-owned and 1 private) of Portugal. Content analysis technique was used to treat information. The analysis of the results allows us to conclude that the types of approaches that prevail are theoretical, the pedagogical practice realization in a real and simulated context, and the theoretical-practical approaches. The professors highlight the existence of several constraints in the training of these teachers, namely of a temporal and organizational nature, the existence of deficits in specific knowledge and pedagogical practice in real context. Among the strategies used by our interviewees to promote inclusion in PE, there is a strong commitment to raise inclusion awareness, the development of an inclusive physical education teacher skills profile and the enhancement of the Inclusion Spectrum model, as an operational reference for the materialization of inclusive practices.

Keywords: Inclusive education; Teacher training; Adapted physical education

Celestino, T, Pereira, A., Ribeiro, E. (2021). Factors for inclusion in Physical Education. *Millenium, 2*(ed espec nº8), 122-122.

FACTORS FOR INCLUSION IN PHYSICAL EDUCATION

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Due to its characteristics, dynamics and inherent values, the physical education (PE) subject, when properly enhanced, can contribute to a more just, equitable and inclusive school. Nevertheless, the lines of investigation aiming the identification, analysis and understanding of the determining factors underlying the inclusive processes in PE have been little explored (Haegele, et, al., 2018). In this sense, the goal of this study is to identify the factors that underlie the success of inclusion in the context of PE. Developed under the qualitative analysis paradigm, the study had as a data collection instrument the semi-structured interview applied to a group of 7 teachers in PE with specialization in adapted PE or special education. This group had an average age of 49 ± 4.7 years, 24 ± 6.29 years of service in total and 13 ± 5.1 years of service as a specialist in inclusion in PE. The data was submitted to the content analysis technique (Bardin, 2008). The results identify a set of personal determinants (valuing students and previous experiences) and contextual determinants (influence of the class group; sharing among peers; individualized support; planning; support of special education; influence of the number of students per class; peer support; pedagogical adaptation; accessible PE).It is concluded that the success of inclusion in PE is closely dependent on the successful interaction between these factors and the mitigation of barriers modeled by the intentionality of the PE teacher.

Keywords: Inclusive education; Adapted physical education; Teacher training

Lopes, M., Cardoso, A. P., Lacerda, C., Campos, S., Pereira, A. (2021). Homework in the 1st Cycle of Basic Education: Parents/ Guardians perceptions. *Millenium, 2*(ed espec nº8), 123-123.

HOMEWORK IN THE 1ST CYCLE OF BASIC EDUCATION: PARENTS/GUARDIANS PERCEPTIONS

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The present study focused on analyzing parent's/guardians' perceptions of their children's homework. For the methodological purposes of this research, a descriptive and cross-sectional study was carried out using through a questionnaire. The empirical research included a non-probabilistic convenience sample, of 262 parents/ guardians of students from the 3rd and 4th years, from the 1st cycle of primary education of Viseu, Portugal. The study results indicate that parents/guardians value homework, and the majority of them consider them to be important and very important. However, some parents/guardians denote as excessive the amount of homework required of their children, which is pointed out as a constraint for their after-school activities, such as leisure with family and friends, playtime, and rest. Most parents/guardians agree with the type of homework requested, namely, readings, forms, and exercises from school manuals. About half of the respondent's compliment and offer rewards to motivate students to carry out their homework. The results also show some difficulties from parents/guardians in accompanying their children with their homework in different exercises, such as interpreting statements and monitoring programmatic contents. Better communication between parents/guardians and teachers could minimize these constraints and moderate work requests.

Keywords: Homework; Parents/Guardians; 1st Cycle of Basic Education; Students

Lopes, M., Cardoso, A. P., Lacerda, C., Novais, A., Cunha, A. M. (2021). Homework in the primary school: teachers and students' perception. *Millenium, 2*(ed espec nº8), 124-124.

HOMEWORK IN THE PRIMARY SCHOOL: TEACHERS AND STUDENTS' PERCEPTION

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Homework is some of the most widespread, but also controversial, strategy used in the first school years. Homework is perceived differently by teachers and students. In this work, primary school teachers and students' perception on homework and its relation with some variables was studied. For that, a descriptive, correlational, cross-sectional survey was performed on 17 teachers and 282 students from year 5 and 6 of Viseu. Data analysis shows that all teachers give homework regularly and they consider it important to learning's consolidation and performance's improvement. Assigned homework mostly covers Mathematic and Portuguese curricular units and the majority of teachers do not give any type of reward for homework completion. Concerning students, was observed that the majority of them likes to do homework and performs it at home with help. When questioned about the possibility of not performing homework there was an association between the decision to do homework and the enjoyment of doing it, as well as with the time available to do other activities. On the other hand, the possibility of not performing homework was not associated with the time spent doing homework. Even though most students enjoy doing homework, they wish they included other areas. For these reasons, it is important to adjust the quantity of homework, as well as to diversify it, both in typology and aims, so that the interest and needs of students are met.

Keywords: Homework; Primary school; Teachers; Students

Ferreira, A. C., Pinto, H. (2021). Problem solving in the context of exploratory education: The case of three 2nd year schoolpupils. *Millenium, 2*(ed espec nº8), 125-125.

PROBLEM SOLVING IN THE CONTEXT OF EXPLORATORY EDUCATION: THE CASE OF THREE 2ND YEAR SCHOOLPUPILS

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This article emanated from an investigation developed in the First Cycle of Basic Education (1st CEB), in a class of 2nd year of schooling, where the researcher was performing her Pedagogical Practice (PP) in the framework of the master's degree in Pre-School Education and Teaching of the 1st CEB. The objective was to perceive the strategies and difficulties presented by the students in the resolution of the addition and subtraction solutions, in the context of exploratory teaching. To achieve this goal, a sequence of tasks (essentially problems) was implemented and the interpretative paradigm was adopted with a qualitative approach and with case study design, the class of the 2nd year of schooling where the researcher was performing her PP. For data collection, participant observation, field notes, audio and video recordings and students' productions were used. For data analysis, the content analysis of the different sources and their triangulation was used, and it emerged that the strategies most used by the students were mental calculation using symbolic representation. The greatest difficulty was the understanding and interpretation of mathematical utterances, which the methodological approach of exploratory teaching adopted seems to have been coliting.

Keywords: Troubleshooting; Strategies; Difficulties; Exploratory teaching; Sense of number

Duarte, N., Ponte, J. P., Pinto, H. (2021). The lesson study in the development of knowledge about collective discussion in mathematics of future teachers. *Millenium, 2*(ed espec nº8), 126-126.

THE LESSON STUDY IN THE DEVELOPMENT OF KNOWLEDGE ABOUT COLLECTIVE DISCUSSION IN MATHEMATICS OF FUTURE TEACHERS

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This investigation aims to understand how the classroom study promotes the development of didactic knowledge of future teachers of 2nd CEB, with regard to collective discussion in the context of exploratory teaching. The class study will be an integral part of the curricular unit of pedagogical practice of the 2nd year of the master's degree in Teaching of the 1st Cycle of Basic Education and of Mathematics and Natural Sciences in the 2nd CEB of a Higher School of Education.

The theoretical framework addresses the initial training of mathematics teachers, class study and collective discussion.

It is a qualitative investigation, with an interpretive paradigm and according to a research based on design in the modality of initial training experience, consisting of two design cycles. Each of these cycles corresponds to a class study where the exploratory approach will be privileged. Each design cycle will follow the fundamental stages of preparation, intervention and retrospective analysis. And the class study will fulfill the five steps: i) preparatory study and problem identification; ii) planning the research class; iii) teaching the research class; iv) discussion of the research class; and v) reflection on the research class. The data will be collected through participant observation using a logbook, interviews and documentary collection. Data analysis will be done at different times, taking place over different phases of each of the two design cycles and the Nvivo software will also be used.

Keywords: Didactic knowledge; Collective discussion; Lesson study; Initial teacher training

Campos, E., Fonseca, S., Amante, M. J., Fernández-Simo, J. D. (2021). Intervention with Families at Psychosocial Risk: perceptions of Portuguese and Galician technicians. *Millenium, 2*(ed espec nº8), 127-127.

INTERVENTION WITH FAMILIES AT PSYCHOSOCIAL RISK: PERCEPTIONS OF PORTUGUESE AND GALICIAN TECHNICIANS

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Any social intervention presupposes a constant sense of evaluation in order to find adequate solutions. Northern Portugal and Galicia, although from different countries, have very similar laws and responses for the intervention with families at psychosocial risk.

The goal of this qualitative, exploratory and comparative study was to know the perception of the technicians of the two realities regarding organizational, family and technical factors that favor or hinder the intervention, seeking to fit them in the respective laws and related scientific works. 9 technicians from different CAFAP in the North of Portugal (NUT II) and 15 Galician family intervention technicians participated in the study. For data collection, was created an ad hoc on-line questionnaire in Portuguese and adapted for Galician context. The data were explored through descriptive and content analysis.

Conclusion: the need for further evaluation and validation of these interventions in Portugal; Galician technicians' focus on creating a link between organization and family and within the family; difficulties in CAFAP in terms of resources, teams and work organization; few references to the systemic character of the intervention; diversion of responses from Galician technicians about organizational and technical factors that constrain the intervention; valuing family awareness and participation and concern for mental health; valuing the technicians' socio-affective skills; success indicators focused on positive family relationships; improvements were suggested, complementary and accordingly, in terms of prevention, networking, resources and training of technicians.

Keywords: Psychosocial intervention; Families; CAFAP; Galicia

Sousa, L., Paiva, T. (2021). Training paths, entrepreneurship and transition to work: perspectives of polytechnic students' finalists. *Millenium, 2*(ed espec nº8), 128-128.

TRAINING PATHS, ENTREPRENEURSHIP AND TRANSITION TO WORK: PERSPECTIVES OF POLYTECHNIC STUDENTS' FINALISTS

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This reflection results from a study on the training path of polytechnic higher education students, through the application, in three institutions, of an online questionnaire survey. We obtained 655 valid answers from the 2019 and 2020 finalists. Considering that self-employment can be a direct consequence of the results of the academic career, it was intended to observe the extent to which it was referred to as a work-life option and how entrepreneurial skills were seized and perceived by students during their training course.

A discussion was conducted on the results obtained, with the behavioural tendency of other studies resulting from the network of entrepreneurship promotion in polytechnics nationwide. It was possible to identify some territorial specificities that national studies do not present and thus allow a better redefinition of programs to promote entrepreneurship and self-employment as a professional option.

In global analytical terms, age, geographical context, and course are distinctive variables in the attitudes in evaluating academic training by the finalists regarding their structure, functionality, innovation, promotion of entrepreneurship, and preparation for an active life. Concerning the forms of active promotion of the transition to work and entrepreneurship by institutions, only about a quarter of respondents move forward with possible mechanisms and strategies of action. Issues relating to promoting more significant links with the labour market are highlighted; more practical teaching, curriculum restructuring mechanisms and increased support for employment and entrepreneurship.

Keywords: Polytechnic Higher Education; Entrepreneurship; Formative path courses; Transition to work

Fernandes, R., Sargento, J., Martins, E., Mendes, F., Felizardo, S. (2021). Entrepreneurship in higher education students of the social area. *Millenium, 2*(ed espec nº8), 129-129.

ENTREPRENEURSHIP IN HIGHER EDUCATION STUDENTS OF THE SOCIAL AREA

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In higher education (IE), entrepreneurship education traditionally occurs in areas of the business world (economics, management). The uncertainty of the labor market requires an entrepreneurial profile, also in the social area. Innovation is increasingly necessary in a social context and the promotion of creativity and design-thinking in the creation of business ideas in these students is crucial. 41 students, 97.5% female, finalists of the Social Education degree, explored their own job creation. An ad hoc questionnaire was used, and responses were submitted to content analysis. The majority (92.6%) showed interest in starting a new company and the others were motivated to innovate existing companies. The investment intention focused on supporting elderly in the community (32.6%) or in institutions (10.8) and people with disabilities (21.7%). Support for the community in general and for minority groups emerged with 10.8% each. The development of community intervention projects and home support services registered, respectively, 46.3% and 36.5%. The majority of students intend to support the business through foreign capital, namely bank loans (41.4%). With less representativeness, own capital (eg anticipation of unemployment benefits - 12.1%) emerged and 36.5% of students did not anticipate the financial support of creating their own jobs. The results are encouraging in relation to students with signs of entrepreneurship in less common areas (social area). Doubts about financial support may result from less investment in these students, highlighting an important path to be taken by higher education institutions.

Keywords: Entrepreneurship; Higher education students; Social area

Figueiredo, N., Fernandes, C., Abrantes, J. L. (2021). The public funds and its influence in the triple helix cooperation. *Millenium, 2*(ed espec nº8), 130-130.

THE PUBLIC FUNDS AND ITS INFLUENCE IN THE TRIPLE HELIX COOPERATION

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Purpose – This study analyzes the influence of local and regional, national, and European government support on companies' cooperation with Triple Helix (TH) agents, i.e., other firms, universities, or governments. The analysis incorporates agents from the same country and another EU country.
Literature review - Innovation is a concern for companies (Badillo, Galera, & Serrano, 2017) to achieve competitive advantages and development (Grant, 2013). The cooperation that companies can establish with universities is crucial as they allow the acquisition of complementary knowledge or capabilities and innovation (Badillo & Moreno, 2016; Iammarino, Piva, Vivarelli, & Von Tunzelmann, 2012; Un & Rodríguez, 2018). However, cooperation between industry and university (U-I) is in the interest of governments as it also allows to countries development. Thus, they must make efforts to encourage such collaboration, namely through the use of public funds (Aiello, Cardamone, & Pupo, 2019; Badillo et al., 2017; Busom & Fernández-Ribas, 2008). The indicator that examines cooperation between university-industry-government (U-I-G) is Triple Helix (TH) (Etzkowitz & Leydesdorff, 2000; Park & Leydesdorff, 2010).
Design/methodology/approach - This research uses the Community Innovation Survey (CIS) database. The method uses logistic regression. Data were published in CIS 2014 (available in 2016), between 2012 and 2014, and 98809 observations.
Findings - The role played by the government, namely through the use of its public funds, is essential for the companies' process cooperation. Thus, the study demonstrates that all public funds positively influence the cooperation process between companies and TH agents of the same country or another EU country. However, not all have the same degree of influence. Central government funds are the ones that most influence companies' cooperation with TH agents from the same country or with companies from another EU country. The European funds have more influence in developing cooperation with universities or governments of another EU country.

Keywords: University-Industry Cooperation; Triple Helix; CIS; Public funding

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Simões, C., Sousa, J. (2021). Relationship between the autonomy and curriculum flexibility and the leadership of principals: Perceptions of teachers. *Millenium, 2*(ed espec nº8), 131-131.

RELATIONSHIP BETWEEN THE AUTONOMY AND CURRICULUM FLEXIBILITY AND THE LEADERSHIP OF PRINCIPALS: PERCEPTIONS OF TEACHERS

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The Autonomy and Curriculum Flexibility (ACF) and the leadership of Principals concepts have been subject of great interest, but as two independent research fields. Based on the perceptions of teachers, this research aims to reflect about new ways for the leadership of Principals, taking into account its role in implementing the ACF, as well as to rethink how their transformational leadership behaviors impact the operationalization of this process. Data were collected through a three-part questionnaire, which includes the Transformational Leadership Questionnaire (MLQ), self-completed by 172 teachers (Mage = 50.73, SD = 6.19). The Statistical Package for the Social Sciences (SPSS) was used for the analyses. The results highlighted the Principals' involvement in the implementation of the ACF, clearly marked by the promotion of the inclusive education and the school grammar that facilitates the process, as well as some tensions in the involvement of the teachers, students and families, in the constitution of the educational teams and in the implementation of the collaborative work. In the Portuguese educational context, these leaders are characterized by transformational and transactional behaviors, with higher scores in the dimension of inspirational motivation. In examining the Principals' leadership styles, data collected also revealed that transformational leadership has an impact and is a predictor of the ACF quality implementation process in the schools. As transformational leadership is what most impacts the ACF, are discussed the implications of the study for Principals, professionals, schools and public policies.

Keywords: Autonomy and curriculum flexibility; Principal; Transformational leadership; Teachers' perceptions

Freire, C., Pereira, R., Silva, C. (2021). Visual impairment concepts for kids and grown up. *Millenium, 2*(ed espec nº8), 132-132.

VISUAL IMPAIRMENT CONCEPTS FOR KIDS AND GROWN UP

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According to World Health Organization data, from February 2021, about 2.2 billion people worldwide are visually impaired. In about half of these cases the impairment could have been avoided or is still to be addressed. In order to be able to diagnose this condition in time and to look for potential paths that allow to overcome barriers that the environment can present, it is essential to understand what visual impairment is and what are the main corresponding concepts.

This work aims to raise awareness of what visual impairment is; describe the main causes and possible forms of prevention; describe the main assistive technologies and strategies that can be used to minimize any difficulties that may exist, given the scarcity of conditions in the environment.

For this, it is intended to demystify the concept of visual impairment, which can be divided between blindness (total loss of vision) and low vision (partial loss of vision). It is also important to know products, strategies and methodologies that may minimize difficulties resulting from space or context not accessible to the diversity of people.

Raising knowledge about all these concepts favors the inclusion of visually impaired people, making it possible to seek ways to overcome the challenges of everyday life and provide a better quality of life for all citizens in an equitable way.

Keywords: Visual impairment concepts; Blindness; Low vision; Assistive technologies

Cardoso, A. P., Ferreira, M., Campos, S., Duarte, J. (2021). Personal and academic context variables as predictors of school dropout. *Millenium, 2*(ed espec nº8), 133-133.

PERSONAL AND ACADEMIC CONTEXT VARIABLES AS PREDICTORS OF SCHOOL DROPOUT

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This article seeks to present the main conclusions of a study that sought to identify personal and academic variables described as predictors of school dropout for higher education students in Portugal. The quantitative study was based on the data collection instrument off a sociodemographic questionnaire, and questions using the Reasons for Higher Education Dropout Scale (Ambiel, 2015), Emotional Skills Scale (Taksic', 2000) adapted for Portugal by Faria and Santos (2006), the QVA-r scale of Quality of Academic Life (Almeida, Ferreira & Soares, 1999) and the scale of Learning Performance of Young, Klemz and Murphy (2003). Total sample consists in (=1175), students of higher education in Portugal. For data analysis, a multiple regression model was performed for each school dropout dimensions. Our results underline the importance of specific predictors: personal variables such as the sociodemographic dimensions of sex and age, and emotional competences, specifically the emotional perception. As for the academic context are identified the importance of learning performance and academic quality of life for students. The identified variables play a significant role as predictors of school dropout in the following dimensions: relational, organizational, life management, and career. In terms of practical implications, it is important to highlight, the need to foster educational programs that are integrated and adapted to different socio-demographic dimensions; and reinforce certain dimensions of the academic context that are more conducive to school integration.

Keywords: School Dropout; Higher Education; Learning Performance; Emotional Competences; Academic Quality of Life; Academic Success

Pinto, H., Dias, I., Duarte, N. (2021). The spatial sense at the daycare: the tower of the cubes. *Millenium, 2*(ed espec nº8), 134-134.

THE SPATIAL SENSE AT THE DAYCARE: THE TOWER OF THE CUBES

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The spatial sense is a concept that is difficult to define since it includes an intuitive component that develops since birth. For Freudhental (1973), it is the grabbing of the space in which the child lives, breathes and moves. Adopting the interpretive paradigm based on documentary analysis (Ludke & André, 1986), this study aims to understand how the spatial sense was developed at a daycare setting, within the episode of the tower of the cubes. From this objective, the following research questions arose: 1. What behaviors do children exhibit in the construction of the tower of the cubes?; and 2. What follow-up do the children have on the part of the adult when they are building the tower of the cubes?

The results reveal that the 11 children (12/24 months) from a daycare center participate in the game spontaneously, moving freely in the space. They approach and move away from the construction place, observe the action of the adult and the pairs, facilitating or disturbing the tower construction. They look for a place between pairs or between the adult and the pairs and adapt the body position to the size of the tower.

Regarding the adult, he makes the cubes available, models behaviors, gives indications, asks questions, collaborates in the reconstruction of the towers, responding to those who are interested in playing with the cubes.

Therefore, what is part of the daycare routine and appears in an intuitive and spontaneous way, with a responsive adult, promotes the development of spatial sense.

Keywords: Adult; Child; Daycare; Spatial sense; Tower of cubes

Melo, A. S. (2021). Formative assessment in higher education: reality or mirage?. *Millenium, 2*(ed espec nº8), 135-135.

FORMATIVE ASSESSMENT IN HIGHER EDUCATION: REALITY OR MIRAGE?

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The change in educational paradigm in higher education, the assessment of skills emerges with it, reinforcing the regulatory sense of learning that informs student and teacher about effectiveness of teaching and learning process, instead of being reduced simply to measurement of final results of learning. We are, therefore, talking about a type of continuous, formative and systematic assessment. In teaching programs, reference to a continuous and formative assessment begins to be evident, although not always what the is recommended in theory can be implemented in practice with the same effectiveness. A process assessment, as is the formative assessment, means, on the one hand, adjusting the criteria to the action to be implemented; on the other hand, include students in the selection of these criteria and ways of evaluating, in a responsible and truly intervening way in the process.

This communication has as main objective to present results obtained in a comparative case study of a master's degree in teaching taught in two higher education institutions in which the participants were students, teachers and course coordinators. Through the analysis of interviews, documentary analysis and focus group, the emerging results demonstrate that although the teachers defend a more continuous type of assessment, periodic assessment remains, where less flexible and summative instruments prevail, such as written tests and exams, where it determines the valorization of the results in relation to the process.

Keywords: Higher education; Formative assessment; Learning regulation

ENGENHARIAS, TECNOLOGIA, GESTÃO E TURISMO

ENGINEERING, TECHNOLOGY, MANAGEMENT AND TOURISM

INGENIERÍA, TECNOLOGÍA, ADMINISTRACIÓN Y TURISMO

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Serrano, A., Abrantes, J. A., Reis, M., Ferreira, B. M. (2021). The dynamics of Portuguese e-shoppers during 2020 lockdown. *Millenium, 2*(ed espec nº8), 138-138.

THE DYNAMICS OF PORTUGUESE E-SHOPPERS DURING 2020 LOCKDOWN

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In the past two decades, much research has focused on online consumer behavior. However, due to the COVID-19 pandemic, it remains unclear why and how consumers react to lockdowns and circulation restrictions regarding shopping. The purpose of this study was to highlight what influences the amount of online shopping. To this end, three factors were mobilized from the literature: the convenience of online shopping, the planning of online shopping, and the online shopping experience. The data were collected by a survey with 197 Portuguese internet users (68% are women). By using multiple linear regression, the findings clearly show that online shopping planning negatively influences the amount of purchases made online between March and May 2020. The convenience of online shopping and the past online shopping experiences affect the amount of shopping positively. One explanation may be that the more you plan to buy something, the less you intend to pay for it. The convenience of online shopping is directly linked to the adoption of online shopping facilities – the easier, the more you buy. About the dimension of past experiences, it also has a positive effect on current purchases. Therefore, those who have had positive experiences buy more. The main limitation of this study is the sample. Despite several attempts to have many respondents, fewer people are participating in this kind of study, which is also a limit of this study.

Keywords: Digital marketing; Consumer behavior; E-commerce; Online shopping

Ribeiro, A. (2021). The Influence of Social Media on Sustainability. *Millenium, 2*(ed espec nº8), 139-139.

THE INFLUENCE OF SOCIAL MEDIA ON SUSTAINABILITY

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Climate change and resource degradation have led governments and companies to adopt more sustainable practices. The interest in sustainable products has grown, and it is essential to understand which strategies companies can follow in their disclosure. This study aims to verify whether social networks can influence a positive attitude towards sustainability and sustainable purchase intention. If the behavior influenced by social media and the behavior influenced by buying is related to a sustainable mindset.

This qualitative exploratory market study collected the data through an online survey based on a non-probabilistic sampling technique, which focused on users of social networks. Network behavior, purchasing behavior, and attitude towards sustainability are the base constructs of this research. After analyzing the data, it may identify that people tend to follow on a network: friends, family, and some digital influencers, who they consider friendly, active, and regular. Regarding purchase behavior, they look for information, opinions, and characteristics. Sustainability is a recognized theme and is associated with the environment and climate change.

In conclusion, some people are available to act more sustainably, and the words reduce, recycle and reuse were repeated. In general, people seem to accept that the path of sustainability is everyone's responsibility. Still, it is impossible to point out a direct relationship between the constructs and the sustainable purchase intention.

Keywords: Influence; Social networks; Sustainable attitude; Sustainable purchasing; Online shop.

Ribeiro, A., Teixeira, J., Antunes, J. (2021). Factors that Influence Customer Loyalty to Culinary Broths in Portugal. *Millenium, 2*(ed espec nº8), 140-140.

FACTORS THAT INFLUENCE CUSTOMER LOYALTY TO CULINARY BROTHS IN PORTUGAL

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Relational marketing has been improving the relationship between customers and organizations. Keeping customers is just as important as attracting them. Thus, the main objective of relational marketing is customer loyalty. Some studies indicate that there is a need to study the factors related to loyalty. In this sense, this study aims to identify the main factors that lead to a loyal customer. The literature review points to a model with the following constructs: experience, satisfaction, innovation, notoriety, tradition, credibility, value, WOM (Word-of-Mouth), and social responsibility, related to loyalty. An exploratory study was realized using an online survey with a non-probabilistic sample for convenience based on these constructs. The data were analyzed using factor analysis and linear regression. It is concluded that satisfaction, credibility and WOM are the constructs most related to loyalty. Satisfaction is mentioned twice in the final model, with satisfaction in the decision and satisfaction in the purchase. Credibility is mentioned with the trust factor and WOM with the promoting client factor. In this way, keeping customers satisfied, fulfilling expectations and conduct can increase customer loyalty. Word of mouth continues to be a means of promoting the brand and increasing customer loyalty.

Keywords: Loyalty; Relational marketing; Satisfaction; Culinary broths

Gomes, A., Wanzeller, C., Fialho, J. (2021). Comparative study of process mining techniques and tools. *Millenium, 2*(ed espec nº8), 141-141.

COMPARATIVE STUDY OF PROCESS MINING TECHNIQUES AND TOOLS

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Process Mining (PM) enables extraction of knowledge concerning operational processes from event logs available in information systems. Current information systems capture massive amounts of data from the organizations processes events. Enterprise Resource Planning (ERP), Customer Relationship Management (CRM), Supply Chain Management (SCM) and workflow Management (WfM) are known examples of such systems. Techniques such as process discovery, conformance checking, model enhancement, and operational support can be used to improve performance and compliance.

PM has great application and interest. All organizations have processes. All of them aspire and are pressured to improve processes efficiency. Moreover, new devices, infrastructures and systems increasingly record more simple and daily events. Consequently, it is a rapidly and promising evolving area. New types of algorithms are constantly emerging to respond to different challenges. New tools and improvements are always rising. Therefore, there is an urgent need for a systematic study, included in our work, in at least three PM aspects: different types of objectives, techniques and algorithms; tools and their characteristics, operations supported and scenarios adequacy; application evolution and methods improvements. This work intends to analyze, for some PM tools (e.g. PM4Py, Disco), different algorithms in process discovery (e.g. Inductive Miner, Alpha Miner, Heuristic Miner) to realize the respective results. This study allows to perceive which algorithm leads to better results, in each tool analyzed. Both free and commercial tools were selected.

Keywords: Process mining; Tools and algorithms; Application types

Carvalho, S., Carvalho, A. B. S., Cunha, M. (2021). Organizational commitment versus job satisfaction in the third sector. *Millenium, 2*(ed espec nº8), 142-142.

ORGANIZATIONAL COMMITMENT VERSUS JOB SATISFACTION IN THE THIRD SECTOR

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Introduction: Organizational commitment and job satisfaction are defined as issues of great interest in the management of human capital, as the evidence shows, they are strongly associated.

Objective: To explain the association between organizational commitment and job satisfaction, as well as their relationship with personal and professional determinants.

Methods: The case study of the institutional subtype, integrates an empirical approach of a descriptive-explanatory nature that investigates a current phenomenon in its real context, enabling its characterization.

The non-probabilistic convenience sample comprised 42 female participants, being that 40.5% aged between 51 and 60 years.

Results: Age was associated with organizational commitment, with participants aged 51-60 having higher scores, (greater commitment), in all dimensions. Contrarily, respondents aged 18-30 scored with lower attachments (less commitment), in the three dimensions. Age only significantly influences the normative dimension of organizational commitment. In turn, the affective component of organizational commitment predicts job satisfaction. Consequently, the stronger the individual's emotional connection with the organization, the greater their satisfaction with work.

Conclusion: In line with other investigations, in the study carried out during the master's internship, it was found that organizational commitment determines job satisfaction, hence they are factors to consider in the management of human resources at the level of the third sector.

Keywords: Third sector; Organizational commitment; Job satisfaction

Seabra, C., Silva, C., Reis, M. (2021). Safety and risk perceptions to travel during COVID-19 Pandemic: Do men and women feel the same?. *Millenium, 2*(ed espec nº8), 143-143.

SAFETY AND RISK PERCEPTIONS TO TRAVEL DURING COVID-19 PANDEMIC: DO MEN AND WOMEN FEEL THE SAME?

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Tourism has been the worst affected of all major economic sectors by the present COVID-19 pandemic (Iaquinto, 2020) and its recovery depend on tourists' perceptions of safety in travel. Previous research suggests that women and men perceive risk differently (Cui et al., 2016; Yang et al., 2017) specially in what concerns to health risks (Mattila et al., 2001). Tourism literature recognizes the importance of analysing gender differences on the perceptions of risk and safety due to the strong impacts on decisions and behaviors (Yang et al., 2017).

Within this context, the purpose of the present study is to identify the differences in safety perceptions to travel domestically and internationally between males and females within the COVID-19 pandemic context. The present work is based on a quantitative research approach using an online questionnaire shared on social media between February.2020 and February.2021. Using snowball sampling, it was possible to collect 1536 answers from respondents in 63 countries. To analyse the differences in risk perceptions travelling in domestic and international destinations between men and women, Mann-Whiney and "Sign test" tests have been conducted.

The findings indicate that, compared to men, women have a higher degree of risk perception when it comes to travel, whether on business, leisure or visiting friends and family. They feel even more nervous than men in traveling today, either within the country or on international trips. Also, women give greater importance to the safety factor in travel and when choosing tourist destinations. Despite, these results are in line with previous studies, they bring important contributions to understand the gender differences in risk perception in the context of Covid-19, not only generally but also in the context of domestic and international trips.

Keywords: Safety Perceptions to Travel; Gender; COVID-19 Pandemic

Pato, M. L., Duque, A. S. (2021). Sustainability of rural tourism: a study based on the websites of TER units in the Viseu Dão-Lafões Region. *Millenium, 2*(ed espec nº8), 144-144.

SUSTAINABILITY OF RURAL TOURISM: A STUDY BASED ON THE WEBSITES OF TER UNITS IN THE VISEU DÃO-LAFÕES REGION

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In context of tourism in rural areas, this link is even stronger, given the environmental specificities and the socioeconomic framework of this type of tourism. Environmental, but also social and economic contributions are expected. However, in order to achieve the recommended sustainability, it is not only essential that the enterprises assume certain sustainable behaviours, but also that they communicate their business philosophy and their products, services and experiences to the market. The purpose of this study is therefore to analyze the communication of these recent years, the relationship between tourism and sustainability has been consolidated. In the sustainability practices.

In methodological terms, based on the registration of tourism enterprises, we started the work with the accounting of tourism enterprises in rural areas, existing in February 2021, in the Viseu Dão Lafões Region (RVDL). Subsequently, based on a content analysis centred on 39 units in the RVDL (which have a web page), a checklist built based on the literature review was used. It was observed whether the enterprises communicate certain information or not, particularly those related to sustainability issues.

The results suggest that despite this emphasis on sustainability and some notable examples, in most cases, the enterprises seem to follow few sustainable practices, thus not communicating them to tourists. Therefore, some practical recommendations are provided, which can be adapted to these rural tourism accommodations, or other.

Keywords: Sustainability; Rural tourism; Communication; Website analysis; Viseu Dão Lafões.

Barroco, C., Kastenholz, E., Pato, M. L., Cunha, D., Alves, V. (2021). Diverse wine route realities – insight from three routes in Central Portugal. *Millenium, 2*(ed espec nº8), 145-145.

DIVERSE WINE ROUTE REALITIES – INSIGHT FROM THREE ROUTES IN CENTRAL PORTUGAL

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Wine tourism is an important area of special-interest tourism in Portugal, and represents an increasingly significant component of regional development. In a more conservative approach, wine tourism has been described as visiting vineyards, wineries and engaging in wine-related activities. However, this perspective has been broadened, taking advantage of all the potential of the specific destination's terroir (nature/landscape, tangible and intangible cultural heritage). Wine routes make the connection between wine and tourism in a specific region and have the function of boosting wine tourism by associating and promoting collaboration between the different stakeholders. Different routes present different approaches to wine tourism and therefore different configurations in the way they are established as a wine route.

This study aims to analyze statistic data related to three wine routes in the central region of Portugal at different stages of development - Bairrada, Dão and Beira Interior - and to compare them with the information collected in 108 interviews conducted with diverse suppliers from these routes concerning the route functioning.

In terms of results, a characterization of the three routes will be presented regarding size and structure, history, visitation numbers, volume of wine sales, number of winery visitors, number of clients in accommodation units, between others. Also the opinion of the suppliers will be analyzed and related with aspects previously described. The differences between routes will be discussed considering the importance of context (regional, demographic, development, but also tourism attractions), the importance of professional structure of wine route and diverse aspects from a more conservative and product focused perspective to a broader and terroir perspective.

Keywords: Wine tourism; Wine routes; Product wine route vs terroir wine route; Suppliers.

This work was financially supported by the project TWINE - PTDC/GES-GCE/32259/2017 - POCI-01-0145-FEDER-032259, funded by FEDER, through COMPETE 2020 - Operational Programme Competitiveness and Internationalization (POCI) and by national funds (OPTDC/GES-GCE/32259/2017 -E), through FCT/MCTES.

Pato, M., L., Figueiredo, I., Pires, M., Serra, T. (2021). The emphasis on rural tourism in times of pandemic situation - case study of a rural tourism unit. *Millenium, 2*(ed espec nº8), 146-146.

THE EMPHASIS ON RURAL TOURISM IN TIMES OF PANDEMIC SITUATION - CASE STUDY OF A RURAL TOURISM UNIT

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Due to the restrictions on confinement and limited travel caused by the COVID 19 pandemic situation, many tourist activities have collapsed or have seen their activity drop dramatically. Rural tourism, due to its characteristics, is seen as one of the best ranked sectors to respond to this crisis. The possibility of social isolation, and contact with nature and the open environment, often in rural areas with few population are among the reasons for this emphasis on the tourist product. However, for this search to be really carried out, tourism units in rural areas, more than before, will have to reinvent themselves.

Based on a case study that focuses on a rural tourism unit that seeks to contribute to the sustainability of the interior region where it is located – the Viseu Dão-Lafões region – the purpose of this study is to analyse the strategies adopted by the tourist unit to mitigate the negative effects of the COVID 19 pandemic situation and enjoy the opportunity to re-affirm the tourist product in the region. To this end, in addition to the literature review and the analysis of various documents about the unit, an exploratory online interview was carried out with the promoter on April 30th. The interview was later transcribed and subjected to content analysis.

The results suggest that despite the widespread crisis caused by COVID 19, the rural tourism unit was able to adapt, taking advantage of the entire calamity situation. Measures such as the adoption of the Clean & Safe seal of Turismo de Portugal, as well as all the disinfection and cleaning measures of the enterprise, the bet on new tourist experiences and the strengthening of sustainability actions, the adjustment of the prices practiced, the reinforcement of the entire communication of the enterprise and the experiences offered are just some of the measures adopted.

Keywords: Rural tourism; Covid-19; Case study; Viseu Dão Lafões

Duque, A. S., Pato, M. L. (2021). Circular economy and tourism: Examples in the hotel sector in Portugal. *Millenium, 2*(ed espec nº8), 147-147.

CIRCULAR ECONOMY AND TOURISM: EXAMPLES IN THE HOTEL SECTOR IN PORTUGAL

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In recent years, the concept of circular economy has been the subject of great attention and object of study in several areas due to the advantages it presents, as an alternative to the linear economy model. The awareness that the planet's resources are being spent at a very high rate, making it impossible in some cases to renew them, raises several environmental and social issues. At the base of the circular economy are the following principles: the elimination of waste, the extension of the use of materials and products and the regeneration of natural systems.

The tourism sector is one of the pillars of the economy for many destinations, being responsible for creating jobs, wealth and contributing to territorial development. However, the use of resources is very high in this activity.

From the perspective of sustainability, we believe it is important to associate the concept of circular economy with tourist activity, to help minimize the negative impacts associated with it. Taking this perspective into account, the main objective of this study is to identify and analyze some good examples, implemented in Portuguese territory, where the concept of circular economy is associated with the tourist accommodation sector.

In this study, two projects will be presented: the HOSPES Program, promoted by the Hotel Association of Portugal and the "Guide to Good Practices for a Circular Economy in Tourist Accommodation", developed by AHRESP. The choice of these projects is because these two institutions are the main national references, regarding the tourist accommodation sector.

After analyzing these projects, some considerations and suggestions will be left for other companies in the tourism sector to implement, progressing on the path to sustainability.

Keywords: Circular economy; Tourism; Hotel sector; Best practices; Sustainability

Estima, A., Barroco, C., Amaro, S. (2021). An exploratory study on Portuguese's attitude towards Street Food. *Millenium, 2*(ed espec nº8), 148-148.

AN EXPLORATORY STUDY ON PORTUGUESE'S ATTITUDE TOWARDS STREET FOOD

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In the past years, the Street Food industry has witnessed significant economic growth worldwide. In Portugal, this sector is estimated to be worth 5.7 million euros. Despite the increase of Street Food research, a small proportion evaluate the use of street food by the consumer (Abrahale et al., 2019). Given its importance and lack of studies conducted in Portugal, this paper aims to examine Portuguese's attitude towards Street Food, as well as their habits and the more important factors to them. An online survey was distributed and completed by 122 participants. The results showed that from those who eat Street Food (95.9%), 48.7% do it more than six times a year. They have a favorable opinion of Street Food, considering it to be a fun experience. Quality, Hygiene and Value were the most important factors for those who eat at these food trucks, while the decor was the least relevant. The most purchased products were ice cream (82.9%), followed by fast food (69.2%). Only 4.1% of the respondents had never tried Street Food, with 60% stating that one reason was the lack of healthier food options.

This study reveals important new insights regarding Portuguese's attitude and habits towards Street Food, gaining a better understanding of the most relevant aspects that can contribute to the growth of the Food Street industry. It is possible to conclude that there is a market for healthier food options in Portugal. Thus, the Street Food sector should provide these options to consumers.

Keywords: Street Food; Healthy Food; Fast Food; Attitude

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Gomes, A., Wanzeller, C., Fialho, J. (2021). Process mining in the health care area. *Millenium, 2*(ed espec nº8), 149-149.

PROCESS MINING IN THE HEALTH CARE AREA

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This work involves studying and applying Process Mining (PM) techniques to data from the health care area. Health care processes are complex and involve steps performed by people from various disciplines and sub-areas. This complexity makes this area interesting, but difficult to analyze and understand. These processes make use of Information Systems (IS) that record large volumes of operating data and are difficult to exploit.

PM can provide help to overcome the mentioned difficulties, since it allows the extraction of knowledge from data generated and stored in IS. Typically, the event logs used for analysis provide timestamps for the stages, as well as the team/person who completed it, along with completion information.

PM is one of the most important techniques used in organizational management that supports processes quality analysis and improvement, based on data from the event logs. PM software can help organizations to easily capture information from corporate transaction systems and provides detailed, data-driven information about how key processes are being executed.

The prominence of the health care field justifies the importance of approaches to improve the resources use. Therefore, this work intends to apply PM to a dataset, using different tools. The results may provide insights (e.g. processes conformity verification and bottlenecks identification) on how to improve the processes and the quality of the services provided. Such may help reducing waiting times, directly improving the quality of services provided and reducing overcrowding for future patients.

Keywords: Process mining; Health care processes; Exploiting Health Care Data

Quinta-Nova, L. (2021). Site suitability evaluation for urban development using GIS and analytic hierarchy process. *Millenium, 2*(ed espec nº8), 150-150.

SITE SUITABILITY EVALUATION FOR URBAN DEVELOPMENT USING GIS AND ANALYTIC HIERARCHY PROCESS

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Urban growth is a continuous process of occupation of space leading to significant concentrations of population and economical activities. Urban land use suitability is influenced by a set of environmental, economic, and social factors, such as ecological values, legal constraints, population growth, the degree of economic development, as well as the integrated planning processes in the territory. To properly zoning the future urban areas, is crucial to use adequate cartography of the area available for urban expansion of the city. It is, therefore, essential to proceed with the analysis of the geographic information including geomorphology, soils, transport network, hydrography, restrictions of public utility and soil cover.

In this work it was intended to evaluate the influence of biophysical and legal constraints on the urban growth, using a set of spatial analysis techniques. The biophysical factors analyzed were classified into three levels of factor-use compatibility, allowing the detection of the most suitable areas for the urban expansion of the city, using the spatial analysis methods provided by ArcGIS 10.8 software and the Analytical Hierarchy Process (AHP).

A pairwise comparison between factors was performed to calculate their relative weights. As a result of the AHP analysis a suitability map was produced. This decision support GIS method could be useful for local development authorities in the aim of urban planning and management.

Keywords: Urban expansion; Land planning; GIS; AHP; Sustainability

Soares, B., Antunes, J. (2021). The influence of loyalty on relationship marketing factors. Study applied to the shampoo market in Portugal. *Millenium, 2*(ed espec nº8), 151-151.

THE INFLUENCE OF LOYALTY ON RELATIONSHIP MARKETING FACTORS. STUDY APPLIED TO THE SHAMPOO MARKET IN PORTUGAL

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The present investigation focused on the analysis of shampoo consumption behavior by Portuguese consumers, from the perspective of relationship marketing. The objective was to analyze the variability of satisfaction, loyalty, trust, perception of the quality-price and the perception of the brand's commitment to its customers, according to the time that consumers use a given brand. The methodology was based on a literature review and an exploratory research, collecting primary data through the application of an online questionnaire. The sample consists of 615 responses, treated using the SPSS. The statistical techniques of Factor Analysis of Main Components and One-Way Anova Tests were used. The results of the analyzes carried out show that consumers who have used a certain brand of shampoo for more than 10 years are less loyal than other consumers. They also demonstrate that consumers who have used a brand for less than five years are less influenced by the family in their choice, and that consumers with higher incomes use, on average, a brand for a longer time. The study allows adding some knowledge in the sense of how certain important factors in relational marketing may fluctuate over the years, namely, loyalty. Finally, the limitations of the study and clues for future research are presented.

Keywords: Relationship Marketing; Satisfaction; Loyalty; Trust; Commitment

Sousa, R., Costa, D. (2021). Shared economy as a vector for gentrification AIRBNB case study in the vidigal slum during the great events in the city of Rio de Janeiro. *Millenium, 2*(ed espec nº8), 152-152.

SHARED ECONOMY AS A VECTOR FOR GENTRIFICATION AIRBNB CASE STUDY IN THE VIDIGAL SLUM DURING THE GREAT EVENTS IN THE CITY OF RIO DE JANEIRO

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Economies and cities are constantly changing. When observing that such changes have as main catalyst the advancement of technology, the approach taken aims to elucidate the role played by the emergence and use of shared economy platforms in the Vidigal favela, in particular Airbnb, and thus verify its relationship with the gentrification process, supported by a scenario of holding mega events held in the city of Rio de Janeiro between the years 2014 to 2016. For its realization, a mixed research strategy was used, composed of quantitative and qualitative aspects, a case study in the Vidigal slum, which is supported by a triangulation between document analysis (statistical data), six semi-structured interviews with residents of the favela of Vidigal focusing on the theme and history of the favela and a participant observation. Alongside this, the presence of four main new conceptions about the term gentrification was verified because of the use of the Airbnb platform in the favela, which are commercial gentrification; public spaces; tourist; and finally, the peripheral. Nevertheless, it appears that the economic impact of Airbnb in the Vidigal favela was momentary, where at first there coexisted a need to supply the demand of the hotel market with the possibility of generating extra income for its residents. However, after the realization of major events, the demand in the hotel sector decreased as well as the use of this platform. In addition, there has been a reduction in public and private investments, just like the return of illegal activities.

Keywords: Gentrification; Shared economy; Slum; Technology

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Melo, R., Rua, M., Silva, M., Rodrigues, S., Leal, R., Morais, P. (2021). Factors influencing the satisfaction of newly graduated nurses, in the integration in the job market / in professional life. *Millenium, 2*(ed espec nº8), 154-154.

FACTORS INFLUENCING THE SATISFACTION OF NEWLY GRADUATED NURSES, IN THE INTEGRATION IN THE JOB MARKET / IN PROFESSIONAL LIFE

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The transition from student to nurse is a challenging moment. Unsatisfactory integration into the labor market can affect the quality of care provided, result in less commitment to the profession and subsequent abandonment. Objective: To identify the factors that influence the satisfaction of newly graduated nurses in their integration into the labor market.

An Integrative Literature Review was carried out, with research in databases (B-ON, ERIC, CINAHL and Medline), using the keywords job satisfaction, employment, job market, (education; nursing; graduate), nurses, expectation, causality and needs assessment, using the Boolean operator "AND". The inclusion criteria (articles between 2014 and 2020, professional experience up to 2 years) and exclusion (nursing students or more than 2 years of professional experience) were used.

The 5 selected articles demonstrated that newly graduated nurses have expectations for the performance of their duties in a positive environment. They highlight the need for initial support, a fact that does not always happen in the different services and, combined with other factors, such as nurse / patient ratio, type of service, previous experiences and needs demonstrated by newly graduated nurses, makes their level of satisfaction is variable.

A positive work environment, an equitable workload distribution, positive previous experiences and adequate support are some of the factors that, together with the fulfillment of expectations and needs, increase the healthy and satisfactory transition of newly graduated nurses to a responsible professionalism. It is important that health services and nursing schools adopt measures that aim to promote an adequate and healthy transition.

Keywords: Job satisfaction; Employment; Education; Nursing; Graduate; Nurses; Needs Assessment

Xavier, P., Amante, M. J., Araújo, L., Fonseca, S., Magalhães, C., Cordeiro, L. (2021). COVID-19 Pandemic and Quality of Life: Perceptions of Portuguese higher education students. *Millenium, 2*(ed espec nº8), 155-155.

COVID-19 PANDEMIC AND QUALITY OF LIFE: PERCEPTIONS OF PORTUGUESE HIGHER EDUCATION STUDENTS

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International evidence suggests that social, family and academic changes associated with the COVID-19 pandemic have implications on quality of life (QoL) of higher education students (e.g., Ramos et al., 2020). This study presents partial data from a broader research project, that aimed to explore the psychosocial impact of the COVID-19 pandemic on students from a public Higher Polytechnic Institution in the central region of Portugal. The definition of QoL was considered as "an individual's perception of his position in life, in the context of the culture and values systems in which he lives and in relation to his goals, expectations, standards and concerns" (WHOQOL Group, 1994, p.28). This is a descriptive and cross-sectional study with a convenience sample of 567 students. A questionnaire was created for this study, consisting of open-ended question, filled online. Among seven options, the participants identified as the main changes those that occurred, mainly, in family routines (64.2%), in personal relationships (62%) and in academic performance (57.3%). The content analysis of the reasons underlying the identified changes predominantly point to the perception of impact on socio-occupational functioning (53.8%), in particular changes in life management (52.2%) and academic life (36.5%), and personal functioning and relationships (46.2%), especially in social relations (26.2%) and family relations (23.6%). More than increasing the knowledge of the impact in this group, these results point to the need to adopt measures that promote quality of life.

Keywords: Higher education; Quality of Life; COVID-19 pandemic

Silva, J., Fernandes, J., Fão, J., Antunes, R., Graça, L. (2021). The relationship between sense of coherence and social integration in higher education. *Millenium, 2*(ed espec nº8), 156-156.

THE RELATIONSHIP BETWEEN SENSE OF COHERENCE AND SOCIAL INTEGRATION IN HIGHER EDUCATION

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The Sense of Coherence (SOC) is an operationalizer of the salutogenic paradigm, allowing to combat stressors and, consequently, to better adapt to new transitions such as Social Integration (SI) in Higher Education with possible repercussions on quality of life and well-being.

The study aimed to evaluate the relationship between the SOC and the SI of higher education students. This is a quantitative, descriptive-correlational study, with an accidental sample of 178 students, predominantly female (74.2%) and aged between 18 and 24 years (84.8%). The data collection instruments were the Sense of Coherence Questionnaire (Nunes, 1999) and the Scale of Social Integration in Higher Education, in the revised and augmented version (Diniz, 2009), with good internal consistency (Cronbach's alpha of 0.883 and 0.910, respectively).

In SOC, the highest values are found in the “Meaningfulness” dimension, with an average of 4.72±0.96. In SI in Higher Education, they occur in “Relationships with Colleagues” with an average of 3.70±0.86. In relation to the lowest values, it is observed in the “Comprehensibility” and “Emotional Balance”, respectively.

Significant correlations (sig<0.05) were observed between the “Comprehensibility” (of SOC) and the dimensions of the SI “emotional balance” (r = 0.634), “relations with peers” (r=0.424) and “relationships with teachers” (r=0.412), not observed for “relationships with friends” and “relationships with family”. "Manageabillity" (SOC) is significantly related to "emotional balance" (r=0.513), "relations with peers" (r=0.359), "relationships with teachers" (r=0.445), " relationship with friends” (0.263) and “relations with family” (0.297). Regarding "Meaningfulness" (SOC), significant correlations are observed in "emotional balance" (r=0.498), "relations with peers" (r=0.361), "relationships with teachers" (r=0.387), “relationship with friends” (0.289) and “relations with family” (0.365).

There are also significant correlations between the SOC and SI scales in Higher Education (r =0.646; sig<0.001).

In summary, students with higher scores of Sense of Coherence have more favorable scores of Social Integration in Higher Education, which can contribute to well-being, success and quality of life.

Keywords: Sense of coherence; Education higher; Students; Socialization

Bica, I., Pereira, A. F., Campos, J. H., Nascimento, L., Amaral, M. I., Ventura, R. (2021). Perception of fathers and mothers about the health-related quality of life of their children. *Millenium, 2*(ed espec nº8), 157-157.

PERCEPTION OF FATHERS AND MOTHERS ABOUT THE HEALTH-RELATED QUALITY OF LIFE OF THEIR CHILDREN

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Objective of study to identify which sociodemographic variables of the parents influence the perception of the QOL of children and adolescentes.

A descriptive-correlational study of a quantitative nature in a non-probabilistic sample for convenience, consisting of 502 parents of children and adolescents attending schools of the 2nd and 3rd cycle of Basic Education. As a data collection instrument, a sociodemographic profile questionnaire was developed for parents and children and adolescents and the KIDSCREEN Scale - 52 © - Adapted from the Portuguese version translated and measured by Gaspar and Matos (2008).

Predominant female participants (84.8%), with 38.3% in the age group of 40-41 years and 32.9% have ≤39 years. The only sociodemographic variable of the parents that interfered in their perception about children's QOL was age, with younger parents (≤39 years) showing the highest perception of QOL, with the exception of bullying, where the highest score (≥42 years), with statistically significant differences in almost all dimensions of QOL.

The results show that parents perceive more positively the children's QOL in terms of bullying, family, family environment and overall mood, suggesting that health professionals, such as nurses, should continue to promote strategies that can enhance the QOL of children and adolescents in the most varied contexts, also providing parents with knowledge, assuming themselves as an adjuvant for the promotion of their children's QOL.

Keywords: Quality of Life; Children; Adolescents; Parents

Carneiro, M., Barbosa, M. I., Sobral, A., Dias, R. (2021). Wellness and preventive health: A comparative analysis between the thermal spas of Monchique (Portugal) and Vila de Vals (Switzerland). *Millenium, 2*(ed espec nº8), 158-158.

WELLNESS AND PREVENTIVE HEALTH: A COMPARATIVE ANALYSIS BETWEEN THE THERMAL SPAS OF MONCHIQUE (PORTUGAL) AND VILA DE VALS (SWITZERLAND)

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Thermalism, integrated in Health and Wellness Tourism, presents a tourist potential in wellness, due to the current trend of demand for relaxation experiences and health prevention. This study is a comparison between two Thermal Resorts: Monchique, located in Portugal, and Vila de Vals, located in Switzerland. The methodology was based on a literature review, a comparative analysis through the web pages of both resorts and the application of a survey to analyze the motivations associated with the practice of thermalism of the aquists in Portugal. The survey was applied online and had a sample of 50 respondents. The results indicate that the current public aims to enjoy the most of the experiences that the tourist destination offers, however, their little knowledge of the hot springs offer makes it difficult to increase their attendance. The results also show that the main motivations for attending the hot springs are "physical and mental relaxation", "being in a peaceful environment" and "benefits of thermal treatments". In the comparative analysis between the two resorts through their web pages, and despite showing significant differences in their facilities and services offered relative to luxury and being inserted in different climates, the two resorts have the potential to position themselves with products that meet current demand needs. The current inclination towards wellness and beauty services inserted in a distinct natural landscape show agreement with the current trend. Finally, the conclusions, limitations of the study, and leads for future research are presented.

Keywords: Tourism; Thermalism; Health and wellness tourism; Caldas de Monchique; Vila de Vals thermal baths

Araújo, L., Fonseca, S., Amante, M. J., Xavier, P., Silva, C., Cordeiro, L., Magalhães, C. (2021). Mental health of Portuguese higher education students assessed through the general health questionnaire in the COVID-19 pandemic. *Millenium, 2*(ed espec nº8), 159-159.

MENTAL HEALTH OF PORTUGUESE HIGHER EDUCATION STUDENTS ASSESSED THROUGH THE GENERAL HEALTH QUESTIONNAIRE IN THE COVID-19 PANDEMIC

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The COVID19 pandemic significantly changed the personal, family, social and academic routines of higher education students, which, according to international studies, had an impact on their mental health (e.g., Göl & Erkin, 2020). This study presents partial data from a broader research project, that aimed to explore the psychosocial impact of the COVID-19 pandemic on students from a public Higher Polytechnic Institution in the central region of Portugal. This is a descriptive and cross-sectional study with a convenience sample of 567 students of a higher education institute (mean age 23.92, ± 8.36; 63.8% female), that have answered an online survey at the beginning of the second lockdown (January to March of 2021). This study focused on the data collect through the General Health Questionnaire (GHQ; Goldberg, 1978; Pais-Ribeiro, 2015) and questions about sociodemographic and academic aspects as well as main changes (e.g., at family routines) that occurred during the pandemic. The mean score of the GHQ was 29.18 (±12.99) and the lowest and highest scores were obtained in severe depression (3.55±4.46) and social dysfunction (11.44±3.81) subscales, respectively. Of the participants, 60.5% indicated risk for mental problems. Participants identifying changes at familiar and labor levels are the ones presenting higher levels of depression ($p<0.05$). These results draw attention to urgently consider the mental health of higher education students, promoting strategies to minimize the impact of the pandemic, namely in social dysfunction.

Keywords: Mental health; COVID-19 pandemic; Students of higher education

Pereira, R., Freire, C. (2021). How to optimize communication and interaction with visually impaired people in primary health care?. *Millenium, 2*(ed espec nº8), 160-160.

HOW TO OPTIMIZE COMMUNICATION AND INTERACTION WITH VISUALLY IMPAIRED PEOPLE IN PRIMARY HEALTH CARE?

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Advances in public health care and people's living conditions and well-being aim to promote a more equitable access to health care services, in order to reduce inequalities. However, the entire population has not got, yet, full access to information on health, and there is a lack of accessible documentation to certain audiences, including people with visual impairment (VI), and sometimes difficulty in communication and interaction with these people.

This study aims to present the perspective of people with VI in terms of: identifying positive initiatives at Portuguese Health Care Centers; describing suggestions that may promote accessibility in these spaces. The exploratory-descriptive study, based on a questionnaire survey to 124 people with VI, allowed answering these objectives.

The results point out the existence of good practices in services organization and the optimization of communication in some Health Centers. As for suggestions for improvement, participants highlight the need for actions aimed at: professionals; services optimization; communication optimization; and architectural issues.

It is essential to (in)form health care agents on communication and interaction strategies with people with VI, in order to provide a health service better suited to the diversity of people. The reflection on communication and interaction with VI people implies the active involvement of professionals, people with VI and organizations, so there may be a paradigm shift.

Keywords: Accessible communication; Visually impaired persons; Primary health care services; Interaction with the diversity of people; Health care services optimization

Teixeira-Lemos, E., Teixeira-Lemos, L. P., Oliveira, J., Chaves, C., Pinheiro, J. P. (2021). Polypharmacy and grip strength in independent older Portuguese people. *Millenium, 2*(ed espec nº8), 161-161.

POLYPHARMACY AND GRIP STRENGTH IN INDEPENDENT OLDER PORTUGUESE PEOPLE

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Reduced hand grip strength (HGS) is associated with adverse health consequences, and there is interest in identifying modifiable influences. The use of multiple drugs simultaneously is especially prevalent in older adults. However, the effects of medication in muscle strength remain unclear.

The purpose of this study is to examine the influence of medication in HGS, in a functional population of Portuguese community-dwelling older adults.

Retrospective, observational study with patients of both genders between 65-85 years of age, who attended a health care facility in central Portugal. Inclusion criteria: age 65-85, FIM ≥120 and TUG≤12s. Individuals with serious cognitive or motor impairment were excluded. Forms were filled including sociodemographic data, daily medication and history of falls. HGS was measured using a hydraulic dynamometer. Informed written consent was obtained for all participants. Inclusion criteria were fulfilled by 108 subjects, mostly females (54,6%), with an average age of 72,28±6,02 years. HGS was on average 24,66±4,75kgf, with significant differences between genders (Males 27,47±5,26kgf, vs females 22,38±2,65kgf; p<0,001). in females. Polypharmacy (more than 5 drugs) was identified in 41,7%. HGS was not influenced by the number of drugs but was lower in individuals who took beta-blockers (p=0,022) and anti-arrhythmic medication (p=0,002). In this population, the use of beta-blockers and anti-arrhythmic medication was associated with reduced handgrip strength, showing that specific medication classes may affect muscle function in older people and, consequently, their functional ability. Care should be taken when prescribing these medications to functionally impaired or frail older adults.

Keywords: Grip strength; Polypharmacy; Older adults; Beta-blockers; Anti-arrhythmic

Silva, E., Roque, H., Fonseca, C., Silva, D. (2021). Nurses' perception of sleep promotion for hospitalized children. *Millenium, 2*(ed espec nº8), 162-162.

NURSES' PERCEPTION OF SLEEP PROMOTION FOR HOSPITALIZED CHILDREN

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Introduction: The child's hospitalization is an important factor in changing life habits and sleep disorganization, through the increase of nocturnal awakenings and waking up and falling asleep early. It is important to sensitize nurses to promote sleep in hospitalized children.

Objectives: To identify nurses' perceptions of sleep promotion in hospitalized children.

Methods: Quantitative and descriptive study. Non-probabilistic sample with 50 nurses working in pediatrics. An ad-hoc questionnaire built for this purpose was used. Ethical procedures were followed.

Results: Most nurses provide interventions to promote sleep in hospitalized children, with the most mentioned strategies being the following: providing a light pattern in order to differentiate the day and night hours, minimizing noise sources (alarms, tone of voice, sliding device at night) and attend to the grouping of procedures and care, however inconsistencies remain.

Conclusion: The intentionality of care in respecting the sleep of hospitalized children is evident, but this research reveals the need for reflection by nurses, in the sense that they are active and mobilizing elements of the multidisciplinary team in the adoption of measures and grounded practices in order to ensure sleep quality.

Keywords: Sleep; Child; Hospitalized; Nursing care; Nurses

Campos, S., Gonçalves, A., Magalhães, C., Ferreira, M., Duarte, J., Cardoso, A. P. (2021). Construction and validation of the scale of literacy in addictive behaviours of higher education students. *Millenium, 2*(ed espec nº8), 163-163.

CONSTRUCTION AND VALIDATION OF THE SCALE OF LITERACY IN ADDICTIVE BEHAVIOURS OF HIGHER EDUCATION STUDENTS

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Introduction: The university is a place for preventive intervention, targeted at information/training needs. Objective: To construct and validate an Additive Behaviour Literacy Scale for higher education. Methodology: Psychometric study, with exploratory and confirmatory factor analysis. The non-probability convenience sample consisted of 924 higher education students, mean age of 22.34 years. Results: The sample, 79.7% female and 20.3% male; 89.5% single; 96% Portuguese; 75% graduated; 74.6% never smoked; 73.9% consumed alcohol; 7.9% accessed the Internet more than 6 hours a day. The scale initially consisted of 25 items, and was reduced to 15 items. This was followed by exploratory and confirmatory factor analysis. Cronbach's Alpha for the 15 items was .896; Total item correlation .896, saturations greater than .40; Barttellet's test of sphericity 4492.100. Initial exploratory factor analysis revealed the existence of 3 factors explained 67.38% of the variance. Forcing 2 factors explained 59.49% of the variance. The Goodness and Global Adjustment indexes presented inadequate values so the model was refined, using the Modification indexes proposed by AMOS. The final model was constituted with 2 factors. All the trajectories of the items for the respective factors presented saturations higher than .50, significant and with good adjustment indices. Conclusions: This scale has good psychometric properties and is a good tool for higher education institutions to apply to their students. It assesses Literacy in Addictive Behaviors and can adjust evidence-based prevention and intervention methodologies and practices.

Keywords: Literacy; Health; Addictive Behaviors; Higher Education; Scale

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