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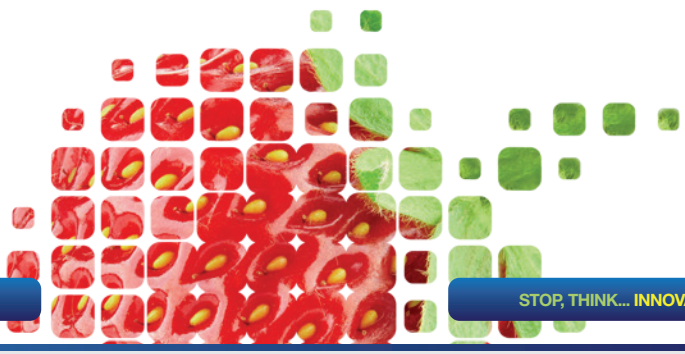
Centro Tecnológico Nacional de la Conserva y Alimentación

X SYMPOSIUM INTERNACIONAL SOBRE TECNOLOGÍAS ALIMENTARIAS

FOOD TECHNOLOGY INTERNATIONAL SYMPOSIUM



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MURCIA (SPAIN)

17 - 18 - 19 MAYO / MAY 2021

LIBRO DE RESÚMENES BOOK OF ABSTRACTS

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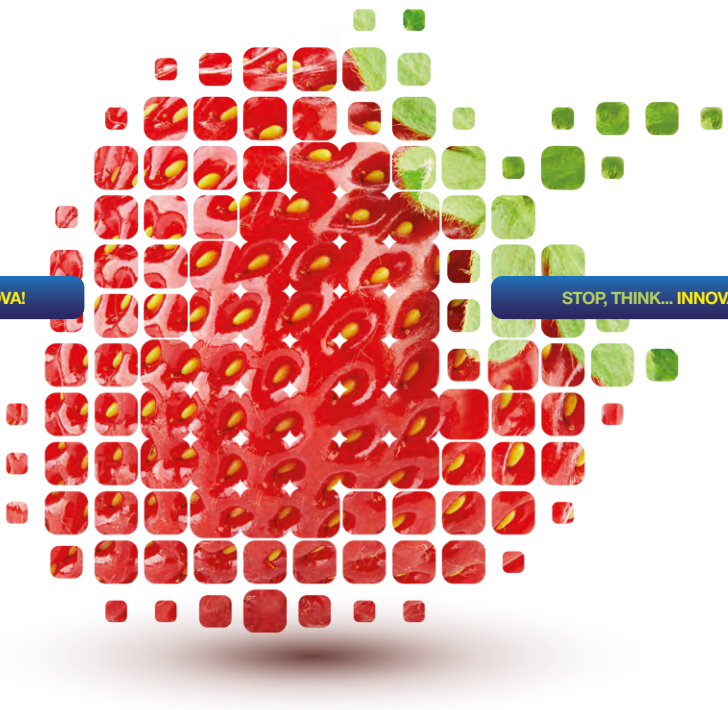

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PRESENTACIÓN

El Centro Tecnológico Nacional de la Conserva y Alimentación, en el marco de las acciones que realiza con Instituto de Fomento de la Región de Murcia y dentro de sus actividades de vigilancia, prospectiva y transferencia tecnológica, celebra, desde 2003 y con carácter bianual, el Symposium Internacional sobre Tecnologías Alimentarias

En 2021, y marcado por los efectos de la pandemia Covid-19, se celebra totalmente online la X edición de este Symposium cuyo Comité Organizador está integrado por el Instituto de Biorecursos Alimentarios IBA de Bucarest (Rumanía), el Instituto Central de Investigación de Alimentos y Control de Alimentos de Bursa (Turquía), el Centro Nacional de Investigación de Egipto, la Consejería de Sanidad, el Instituto de Fomento INFO, la Fundación Clúster Agroalimentario y la Academia de Ciencias Veterinarias de la Región de Murcia, la Plataforma Food4Life Spain, el Campus Mare Nostrum, el Centro de Referencia Nacional de Industria Alimentaria – Área de Conservas Vegetales y el CTNC. La organización no hubiese sido posible sin la colaboración del Comité Organizador así como del Comité Técnico integrado por las industrias ALLFOODEXPERTS, VICKYFOODS, HERO ESPAÑA S.A., MARÍN GIMÉNEZ HERMANOS S.A., CYNARA EU y VEGYTECH S.L. A todos ellos nuestro especial agradecimiento por su dedicación.

Tres han sido los temas propuestos para este décimo Symposium: ***Sostenibilidad de la industria alimentaria, Tecnologías del Agua – Proyecto iWatermap y Nuevas tendencias, experiencias y oportunidades.*** Todos ellos han sido elegidos por su importancia actual para el sector agroalimentario que debe adaptar sus procesos y productos hacia soluciones que hagan sus elaborados más competitivos en el mercado, más atractivos para el consumidor, más amigables con el medio ambiente y, a su vez, permitan asegurar la viabilidad y sostenibilidad de la actividad empresarial y del crecimiento del sector en búsqueda de nuevos mercados.

Un gran número de ponentes y participantes provenientes de distintos países tendrán la oportunidad de intercambiar conocimientos y experiencias en este Symposium. Desde el CTNC agradecemos a todos ellos, y a los centros que han colaborado, su inestimable contribución al éxito de este evento.

Esperamos que este Symposium sea de interés para las empresas del Sector y que favorezca la introducción de los temas tratados en el día a día de la empresa.

José García Gómez
Presidente

FOREWORD

The National Technological Center for the Food and Canning Industry CTNC, within the framework of the actions carried out with the Regional Development Agency of the Region of Murcia INFO and within its surveillance, prospective and technology transfer activities, celebrates, since 2003 and on a biannual basis, the International Symposium on Food Technologies.

In 2021, and marked by the effects of the Covid-19 pandemic, the 10th edition of this Symposium is celebrated totally online. Its Organizing Committee is integrated by the Institute of Food Bio-Resources of Bucharest IBA Romania, the Central Research Institute of Food and Feed Control CRIFFC Turkey, the National Research Centre NRC Egypt, the Regional Ministry of Health, Regional Development Agency INFO, AGROFOOD Cluster Foundation and Academy of Veterinary Sciences of the Region of Murcia, the Food4Life Spain Platform, Campus Mare Nostrum, National Reference Centre in Food Industry – Canned Vegetables Area and the CTNC. The organization of this International event would not have been possible without the collaboration of the Organizing Committee and the Technical Committee integrated by the industries ALLFOODEXPERTS, VICKYFOODS, HERO ESPAÑA S.A., MARÍN GIMÉNEZ HERMANOS S.A., CYNARA EU and VEGYTECH S.L. To all of them our special thanks for their dedication.

Three are the topics selected for this tenth Symposium: **Sustainability of Food Industry, Water Technologies - iWatermap project and New trends, experiences and opportunities**. All of them have been chosen for their current importance for the agri-food sector, which must adapt its processes and products towards solutions that make its products more competitive in the market, more attractive to the consumer, more environmentally friendly and, at the same time, make it possible to ensure the viability and sustainability of business activity and the growth of the sector in search of new markets.

A large number of speakers and participants from different countries will have the opportunity to exchange knowledge and experiences at this Symposium. From the CTNC we thank all of them, and the centres that have collaborated, for their invaluable contribution to the success of this event.

We hope that this Symposium will be of interest to companies in the Sector and that it will facilitate the introduction of the topics discussed in the daily activities of the company.

José García Gómez
President

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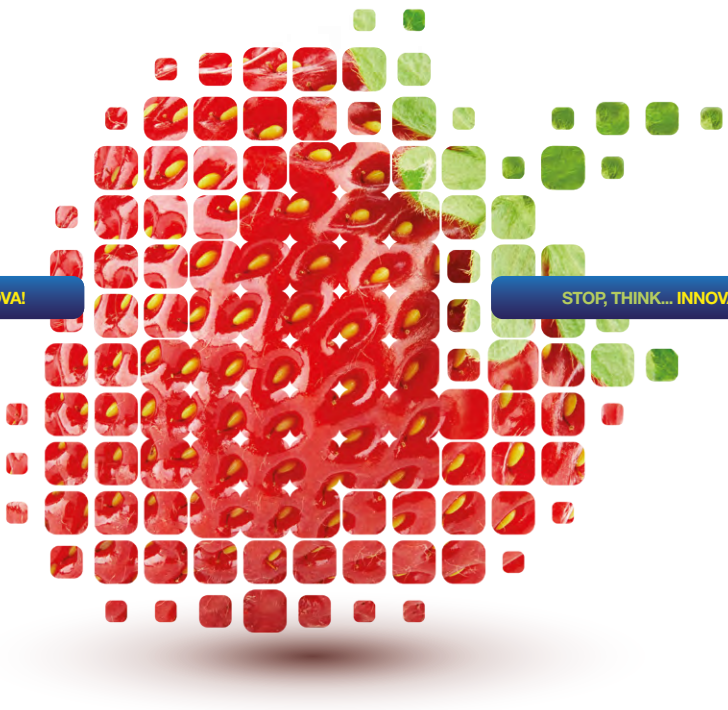

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Los organizadores agradecen a todos los técnicos, empresas e instituciones que han contribuido con su trabajo al éxito del Simposium.
The Organizers would like to deeply thank all the experts, companies and Institutions have contributed with their work to the success of the Symposium.

La información proporcionada en el Libro de Resúmenes se basa en los resúmenes enviados por los participantes en el Symposium.
La exactitud y contenidos de los resúmenes enviados son responsabilidad exclusiva de los autores.
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X SYMPOSIUM INTERNACIONAL SOBRE TECNOLOGÍAS ALIMENTARIAS
10th FOOD TECHNOLOGY INTERNATIONAL SYMPOSIUM

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X SYMPOSIUM INTERNACIONAL SOBRE TECNOLOGÍAS ALIMENTARIAS
FOOD TECHNOLOGY INTERNATIONAL SYMPOSIUM

Monday, 17th May 2021
Sustainability of Food Industry
Chairs : Nastasia Belc and Presentacion Garcia

10:00 / 10:05 h **Welcome / Introduction**

10:05 / 10:20 h **Mediterranean Citrus: innovative soft processing solutions for S.M.A.R.T (Sustainable, Mediterranean, Agronomically evolved, nutRitionally enriched, Traditional) products. MEDISMART Project.**
Elsayed Elhabasha. NRC, Egypt

10:20 / 10:35 h **LIFE CITRUSPACK "Revalorization strategies within the circular economy for the use of citrus waste in green packaging and cosmetics".**
Carolina Peñalva Lapuente, AITIIP Centro Tecnológico, Spain

10:35 / 10:50 h **Opportunities of Antioxidant Dietary Fibers from Plant By-Products as Functional Ingredients.**
Manuela Pintado. Universidade Católica Portuguesa, Portugal

10:50 / 11:05 h **Application of natural ingredients for the bromatological improvement of clean label food products.**
Gema Nieto Martínez. University of Murcia, Spain

11:05 / 11:20 h **Sustainability in the olive oil production. Troil as an example of pomace treatment plant and the research Operational Group INNOEXTRACT.**
José Calama. Troil Vegas Altas S.C. Spain

11:20 / 11:45 h **Break**

11:45 / 12:00 h **How the food industry could meet the sustainability requirements.**
Nastasia Belc, Denisa Duță, Claudia Moșoiu. IBA, Romania

12:00 / 12:15 h **Consumer driven development of new tomato products added with functional ingredients extracted from industrial wastes.**
Sebastiano Porretta. Experimental Station for the Food Preserving Industry SSICA, Parma, Italy.

12:15 / 12:30 h **Development of functional ingredients rich in dietary fibre and phenolic compounds from agri-food industrial by-products.**
Nieves Baenas Navarro. University of Murcia, Spain.

12:30 / 12:45 h **Erasmus+ EU FIELDS project: bioeconomy, digitalisation and sustainability skill needs designed with a multidisciplinary approach.**
Remigio Berruto. University of Turin, Italy

ONLINE POSTER SESSION

12:45 / 13:00 h **Questions**

FIRST SESSION.
MONDAY 17th MAYO 2021.
SUSTAINABILITY OF THE FOOD INDUSTRY

1.1.

MEDITERRANEAN CITRUS: INNOVATIVE SOFT PROCESSING SOLUTIONS FOR S.M.A.R.T (SUSTAINABLE, MEDITERRANEAN, AGRONOMICALLY EVOLVED, NUTRITIONALLY ENRICHED, TRADITIONAL) PRODUCTS, MEDISMART PROJECT.

Elsayed Elhabasha
NRC, Egypt

Professor in National Research Centre in Cairo. He is coordinator of the EU Prima project MEDISMART with partners from Egypt, Turkey, Italy, Portugal and Spain. He holds his PhD in 2005 from Cairo University and got the Professor degree in 2015. He has a good experience on scientific and demonstration projects, authored more than 48 published papers in different peer reviewed international journals and many book chapters. Key scientific interests: study the plant nutrition and plant physiology of different plants, increase the tolerance of plant under abiotic stress, cultivation and production of traditional and non-traditional plants, soil quality management and crop production, optimizing agricultural supply microelement crops, organic farming, experiences in hydroponic and high efficient plant factory technology. He works as Editor in Chief of Agricultural Studies, ITS Publication, Editorial Board Member of Journal Future of Food: Journal for Food, Agriculture and Society. Participate as member and PI in many national and international projects. Organizing and participating in many conferences and workshops.

Abstract

MEDISMART project was approved under the PRIMA programme, Section 2- Multi-topic 2019 of the Call Agro-food Value Chain, topic 2.3.2 RIA Enhancing horizontal and vertical integration of Mediterranean agro- food value-chains to foster innovation and sustainability. With a duration of 36 months it started on 1st October 2020.

NCR Egypt is the coordinating institutions. The rest of partners are: SSICA Italy, CRIFCC and TARIMAS Turkey, Catholic University of Porto Portugal and AMC (with the collaboration of CTNC) Spain.

Citrus is one of the most widely cultivated fruit crops and one of the main agro-food products in the Mediterranean area. Citrus peels, if treated as waste materials, can create environmental problems. This problem could be turned into an advantage, if potentially marketable by-products can be extracted and valorized in several added-value ingredients.

The objectives of the projects are: Use of eco-friendly substances as an alternative to any chemicals in agricultural practices; Extraction and purification of some valuable compounds

which can be used in agriculture, pharmaceutical, nutraceuticals, food and cosmetic industries, Identification of innovative packaging materials, Application of a hydrogel as soil improvers to increase the water-holding capacity and/or nutrient retention of sandy soils and Identification of innovative process technologies strongly preserving the naturalness and properties of the products raising final quality in terms of nutrition and sensory aspects: HPP, US.

Some of the expected impacts are: these new products will create a new market, characterized by a different perception of the product and they exert leverage for the whole sector of fresh and processed fruit, to create in Mediterranean countries affordable and innovative strategies towards citrus waste and byproduct reuse, to promote the use of healthy “clean label” with natural ingredients in agro-food industry, to transfer project know-how to farms and industry operators, in order to enable operators to apply the proposed processes and technologies at industrial scale and to produce green pesticides, hydrogel NPK fertilizers and green fertilizers which will reduce the agriculture pollutants and improve the environment.

The creation of the MEDISMART Foundation will safeguard the MEDISMART project’s results beyond the funding period.

1.2.

LIFE CITRUSPACK "REVALORIZATION STRATEGIES WITHIN THE CIRCULAR ECONOMY FOR THE USE OF CITRUS WASTE IN GREEN PACKAGING AND COSMETICS"

Carolina Peñalva Lapuente
AITIIP Centro Tecnológico, Spain

She developed her doctoral thesis in Food Science and Technology at the University of Zaragoza (Spain) Carolina Peñalva is Packaging Responsible at AITIIP Technological Centre where she joined in 2013. Her work has been based on the advancement of knowledge on biobased and compostable materials for packaging and agricultural products and the integration of new technologies in the agrifood sector. She is author and co-author of +20 technical papers in indexed journals and conference communications.

She has actively participated in the management and execution of competitive and non-competitive R&D projects. She has coordinated LIFE MULTIBIOSOL and LIFE CITRUSPACK projects. Recently, Peñalva has participated as member of the EIP-AGRI working group of the European Commission "Reduction of the plastic footprint of agriculture".

Abstract

Oranges, tangerines, and other citrus fruits can have a much longer life than imaginable. Its existence is not limited exclusively to food, and the trash bin does not have to be its end of life. Peels and pulp, that are, citrus residues, can be transformed into essential raw material to develop new sustainable products. For example, these residues can become juice bottles destined to contain the juice of a new citrus fruit, and even the star base of a 100% natural moisturizer for the face, packed into cosmetic packaging made of citrus waste sources.

The CITRUSPACK project is part of the LIFE Program, which is the only financial instrument of the European Union dedicated exclusively to the environment. After three years of ambitious research, CITRUSPACK has managed to develop three prototypes of bioproducts that will revolutionize the packaging industry and cosmetics: a bottle of juice (bio-bottle), a cosmetic jar (bio-jar) and a moisturizing facial cream. All this, from the citrus residue. Several technology centres, laboratories, and companies from up to five different EU countries (Spain, Greece, Slovenia, France, Belgium) have been involved in the project. Among them, the technology centre AITIIP, coordinator of the project, AMC group, Eroski, and the international partners OWS Nv (Belgium), OLVETIA (Greece), Plastipolis (France) and TECOS (Slovenia).

Currently, only in Spain, hundreds of thousands of tons of citrus waste are generated every year that do not stop having a high potential for use. Much of that residue is used as livestock feed, but

its rapid fermentation makes it an environmental problem. Furthermore, due to its high moisture content, the transport of waste is very expensive, also creating a logistical problem.

On the other hand, the environmental impact derived from the massive generation of plastic waste and the harmful treatment that is made of them, has activated all the alarms on a global scale. The increase in the use of synthetic polymers has generated ecological problems due to their non-biodegradable nature and their non-renewable fossil origin. CITRUSPACK contributes to closing the cycle, offering sustainable alternatives that favour a more responsible behaviour within the field of agriculture and consumption, thus contributing beneficially to society.

In the end, the CITRUSPACK project proposes the Circular Economy as a transversal solution to the environmental problem. A sustainability that is materialized in packaging products or moisturizing creams that have managed to be developed from citrus fruit waste, and that themselves configure the complete cycle of that Circular Economy. At the same time, it improves market opportunities for farmers and producers, thanks to the diversification of waste within a new value chain.

1.3.

OPPORTUNITIES OF ANTIOXIDANT DIETARY FIBERS FROM PLANT BY-PRODUCTS AS FUNCTIONAL INGREDIENTS

Manuela Pintado

Universidade Católica Portuguesa, CBQF, Portugal

Maria Manuela Estevez Pintado is currently Associate Professor of the College of Biotechnology of the Portuguese Catholic University (ESB-UCP), Associate Director of School of Biotechnology from Universidade Católica Portuguesa (ESB-UCP, Porto, Portugal) and the director of CBQF (Chemistry and Biotechnology Center – State Associate Laboratory), a ESB-UCP research unit and Associate Laboratory. In research field she is Leader of Biobased and Biomedical Group and Head of Bioactive and Bioproducts Research Laboratory.

Abstract

One of the main components of several plant by-products is dietary fibre (DF), mainly insoluble dietary fibre (IDF). Besides the health benefits of IDF by itself, polyphenols are essential constituents of IDF with relevant properties [1]antioxidant dietary fiber (ADF. The concept of antioxidant dietary fibre (ADF) proposed by Saura-Calixto [1]antioxidant dietary fiber (ADF combines the physiological and technological benefits of both DF and antioxidants **[2]**.

Different fibre-rich powders have been developed in our research group obtained from different fuits and vegetable byproducts using different technologies and some examples will be covered during this presentation - tomato, mix of vegetables, avocado, melon, pineaple and olive pomace. All of them exhibited high fibre content and relevant antioxidant activity, allowing it to be claimed as ADF source**.**

During this presentation comparative levels of ADF and the related antioxidant activity will be presented as affected by the source or the extraction method. The impact of digestion on the phenolics present in ADF associated to their health benefits will be also presented. Finally, the impact of some of the digested fibre-rich powders on gut microbiota will discussed.

References:

1. Saura-Calixto F. J Agric Food Chem [Internet]. **1998** Oct;46(10):4303–6.
2. Quirós-Sauceda AE, Palafox-Carlos H, Sáyago-Ayerdi SG, Ayala-Zavala JF, Bello-Perez LA, Álvarez-Parrilla E, et al. Food Funct. **2014**;5(6):1063–72.

1.4.

APPLICATION OF NATURAL INGREDIENTS FOR THE BROMATOLOGICAL IMPROVEMENT OF CLEAN LABEL FOOD PRODUCTS.

Gema Nieto Martínez

University of Murcia, Spain

Gema Nieto, teacher at the School of Veterinary and Food Science and Technology (FVETUM), Vice-Dean of FVETUM since 2020. She received her M.S. in Human Nutrition and M.S. Food Science and Technology (University of Murcia in 2004). She did several stays in centers of high international prestige: University of Kentucky, USA (2006, 2008), and University of Life Science, Copenhagen, Denmark (2007, 2009). She has continuous her scientific career in the Department of Food Science and Technology at the University of Murcia, first as researcher scholarship, then, since April 2017, as academic Researcher. She has been PI of several projects of R&D and innovation related to human nutrition, natural extracts, functional foods, meat science and food technology. She has developed numerous projects, many related to agro-industry and food companies, and acquired extensive experience in the field of food technology and human nutrition.

Abstract

Trends in food are changing rapidly in recent years, and food businesses need to put in place strategies that match or anticipate these new ways of thinking about food choice and consumption. Knowing how food has been produced or what impact it has on our body, our well-being or the environment will have an increasing weight in consumption decisions. Meat and animal products and their derivatives are perishable foods that suffer a gradual loss of bromatological quality during their conservation, both in refrigeration, in a controlled atmosphere, and in freezing. It is for this reason that since the last century, and up to the present day, the widespread use of synthetic additives (sulphites, BHA, BHT, and nitrifying agents) has been extended in order to prolong the shelf life of this type of product. However, excess consumption of this type of ingredients has reported the possibility of having health effects from excessive exposure.

Antioxidant compounds, both natural and synthetic, are substances that retard the oxidation of food products by inhibiting the formation of free radicals or interrupting this pathway through some specific mechanisms. One of these pathways is the transfer of hydrogen atoms, when the antioxidant compounds (AH) gives an H to a free radical (R-), generating a more stable radical (A-) ($R- + AH \rightarrow RH + A-$), while the other way is the transfer of electrons, when AH gives an electron to reduce the free radical ($R- + AH \rightarrow R- + AH-$). In parallel, in terms of their chemical nature and origin, these compounds could also prevent bacterial development by inhibiting several functions, such as maintenance of the cell wall of bacteria, protein synthesis, transport or DNA replication, as the main mechanisms of antimicrobial action.

The development of strategies for obtaining “Clean label” food products (by reducing the concentration of certain synthetic additives associated with “E” numbers and by using natural extract rich in bioactive compounds) is an important challenge. The strategies followed for their bromatological improvement aim to contribute especially to the knowledge within the field of antioxidant and antimicrobial agents of natural origin. For that, there are two ways of incorporating antioxidant compounds, one endogenous and the other exogenous

The aim of this speak is to disseminate basic knowledge about the production of “Clean label” food products following different treatments and the organoleptic, oxidative and microbiological changes that occur during the conservation of this kind of products.

1.5.

SUSTAINABILITY IN THE OLIVE OIL PRODUCTION. TROIL AS AN EXAMPLE OF POMACE TREATMENT PLANT AND THE RESEARCH OPERATIONAL GROUP INNOEXTRACT

José Calama

Troil Vegas Altas S.C., Spain.

Agronomist Engineer passionate about energy saving and dedicated to research on products from oil mill sludge, with special dedication to the treatment and use of vegetable water.

Abstract

The presentation will be focused in the treatment of the olive pomace with the process used in TROIL Vegas Altas. Drying, transforming and preparing the final products for the actual and future markets open towards the next decade.

There are several ways of processing pomace and TROIL is using the most efficient energetically nowadays utilizing the exhaust hot air coming from the dryer and directing it to a concentrator to evaporate most of the vegetation water obtained during the drying process. This way, energy that is considered barely useful, saturated air at 80º C, is transported to a tower where the vegetation water is sprayed over this flow so we can prepare the product to keep as many phenols as possible in a way that can be process in other industries.

TROIL treats the olive Pomace searching for new markets and is included in the project "INNOEXTRACT", to reach new more sustainable markets for functional molecules.

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1.6.
HOW THE FOOD INDUSTRY COULD MEET THE SUSTAINABILITY REQUIREMENTS

Nastasia Belc, Denisa Duță, Claudia Moșoiu
IBA Bucharest, Romania

Nastasia Belc is General Director of the National R&D Institute for Food Bioresources, IBA. She is food senior scientist, PhD, and professor to the Faculty of Biotechnology within University of Agronomy and Veterinary Medicine, in Bucharest. She is member of Romanian Academy for Agricultural and Forestry Sciences, member of Consultative Council of Ministry of Research and Innovation, member of Scientific Council of the Sanitary Veterinary Authority and food Safety and member of The Accreditation Council of RENAR (National Accreditation Body). She is nominated by Ministry of Research and Innovation to be member of Governing Board of Food security, Agriculture and Climate Change, FACCE JPI and member of Healthy Diet for a Healthy Life Management Board, HDHL JPI. Since 2017, she is also Node Reprezentative for METROFOOD-RI.

Abstract

It is known that the global food system should face a huge demand for foods for a growing number of people. On the other hand, the food system, particularly food industry is responsible for significant impacts on the environment such as water depletion and land use, as well as climate change. The food sector is also key to achieving several of the Sustainable Development Goals (SDGs) established in 2015 by the United Nations, such as SDG2 - Zero Hunger, SDG3 - Good Health and Well-Being, SDG12 - Responsible Production and Consumption and SDG13 - Climate Action.

There will be a major challenge in maintaining a continuos increasing production while assuring a healthy and regenerable environment. For this, food industry should ensure the reduction of CO_2 emissions, the reduction of water and energy consumption and the reduction of food losses and waste on the food chain taking into account the impact of the food system on ecosystem and biodiversity.

At the same time, according with the SDGs, the food system should give a better access to healthy foods and diets and should increase economic competitiveness in order to feed all people. New food products are being continuously designed and manufactured. Nevertheless, taking into consideration the sustainability requirements in the new food product development process has significantly more potential to improve the optimization and efficiency of the overall food chain.

It has been estimated that nearly 80% of the economic costs of products are defined during product design (Cooper & Chew, 1996) and around 80% of the environmental impact of a

product is determined at the design phase (DG Enterprise&Industry and DG Energy - European Commission, 2014; McAloone & Bey, 2009). Because of this, there is a potential to reduce environmental and economic costs, and consequently improve sustainability performance, by proactively assessing the products before they are produced. Prevention approach is desired instead the than using a reactive approach to minimize impacts of a product already designed (Garcia-Garcia & Azanedo & Rahimifard, 2021).

Anyway, some general measures should be taken at the level of global food system: investigating the nutritional profile of material resources and diversifying raw material resources for the food industry; re-engineering of technological processes in the sense of efficiency and sustainability; recovery of waste and by-products in products with high added value; optimizing food consumption in terms of quantity and quality, encouraging a sustainable eating behavior.

1.7.

CONSUMER DRIVEN DEVELOPMENT OF NEW TOMATO PRODUCTS ADDED WITH FUNCTIONAL INGREDIENTS EXTRACTED FROM INDUSTRIAL WASTES

Sebastiano Porretta

Head Marketing & Consumer science area, Experimental Station for the Food Preserving Industry, Parma, Italy

Sebastiano Porretta is first researcher of the Ministry of Economic Development at the Experimental Station for the Food Preserving Industry in Parma. Known to the International Scientific Community for his studies on the development of new systems for the evaluation and optimization of quality in its manifold aspects, he has held coordination and management roles in National and European research projects. For years he has been dealing with the issues of sensory analysis and consumer science with original methodological and concept contributions, developing the planning of new products (or the updating of existing ones) and studying the interactions between food composition and market acceptability. He is the author of several articles and essays published in international journals and books and the author / editor of around thirty books.

Abstract

The paper reports the development of a renewed and sustainable supply chain of the tomato industry obtained through innovative process technologies (UHPP) capable of preserving the sensory and nutritional values of the starting raw material, and packaging properties more in keeping with the changing needs of the market. It also intends to enhance industrial waste through the integral use of skins and seeds. A wide range of processed fruit and vegetable products (pureed, pulp and bio-whole peeled tomatoes) linked to tradition is taken into consideration, but strongly adhering to the current demands of the market whose demand is oriented towards nutrition: therefore, not only products, but also services and health. Particular attention is dedicated to the reuse of industrial waste (the real critical point of the entire tomato industrial chain) and to innovation in transformation processes (UHPP technology at high hydrostatic pressures) which will allow the development of new products with unprecedented qualitative properties, so that both large companies and SMEs in the sector can increase their competitiveness in the national and international context. The use of innovative product and process solutions generated by the project and their integrated application will allow companies to optimize transformation processes, expand the sector of use of their technologies, improve them and create new areas and business opportunities. In addition, to processing companies will be allowed to put on the market products with greater added value for quality and intrinsic sensory properties, and therefore to increase the value of production and at the same time to reduce waste during the processing phase. Public

businesses and large-scale distribution will be able to offer products with greater added value, with conservation of natural characteristics and better and more natural shelf life, compatible with distribution logistics while to the final consumer to have safe and quality products, which entail a final benefit in health terms with a strong focus on the sustainable development of the entire sector.

1.8.

DEVELOPMENT OF FUNCTIONAL INGREDIENTS RICH IN DIETARY FIBRE AND PHENOLIC COMPOUNDS FROM AGRI-FOOD INDUSTRIAL BY-PRODUCTS

Nieves Baenas

University of Murcia, Spain

Nieves Baenas is Agronomist Engineer specialized in Nutrition, Food Resources and Technologies. She works as post-doctoral researcher in the Research group of Human Nutrition and Food Science at the University of Murcia. Her research interests include: Bioactive compounds from plant foods, revaluation of agro-industrial by-products and their application in nutrition and health.

Abstract

In Spain, around 30 million tons of waste are generated from the agri-food industry, agricultural surpluses and distribution. Of the total waste, 40 % is used in animal feed, energy generation or composting, however, the 60 % represents a waste from this sector. Specifically, the Region of Murcia (Spain) accounts for the 24 % of the national sector of canned fruits and vegetables, being necessary to develop technological solutions to reduce the environmental impact of agro-wastes by their revaluation within an economic circular production system. Agro-industrial by-products, as well as their original vegetables, are a source of nutrients and bioactive compounds with beneficial effects for human health. Especially, by-products have high content of dietary fibre, as these residues generally consist on peels, seeds and fruit surpluses and discards, which confers multiple health effects. While the insoluble fraction facilitates gastrointestinal tract passage and, as a consequence, decreases glucose and fat absorption, the soluble fraction provides prebiotic effects by modulation of gut microbiota, producing metabolites such as short chain fatty acids (SCFAs), responsible of maintaining the gut barrier integrity, promoting the immune system and inhibiting the growth of pathogens, among others. But not only dietary fibre is responsible of gut microbiota health, also the presence of bioactive compounds attached to fibre polysaccharides reach the colon and are metabolised by the gut microbiota. In particular, phenolic compounds transformation by microbiota results in the production of SCFAs and phenolic catabolites, mainly phenolic acids and urolithins, with anti-inflammatory, antioxidant and antimicrobial effects. For this reason, fruit and vegetable residues rich in dietary fibre and phenolic compounds, such as winery by-products or berry pomace, can be used as ingredients with a high value as functional, prebiotic and/or technological components, for innovative food products.

1.9.

ERASMUS+ EU FIELDS PROJECT: BIOECONOMY, DIGITALISATION AND SUSTAINABILITY SKILL NEEDS DESIGNED WITH A MULTIDISCIPLINARY APPROACH

Francesca Sanna[(1)], Remigio Berruto[(1)], Botta Giulia[(1)], Daniele Rossi[(2)], Luis Mayor[(1)], Friis Lindner[(3)], Christoph Knöbl[(3)] Patrizia Busato[(1)]

1. University of Turin, Department of Agricultural, Forestry and Food Sciences, Largo P. Braccini 2, Grugliasco, Torino, Italy

2. Confederazione Generale dell'Agricoltura Italiana Confagricoltura, Corso Vittorio Emanuele II, 101, Roma

3. ISEKI Food Association, c/o Department of Food Sciences and Technology, Muthgasse 18, 1190 Vienna, Austria

Prof. Berruto has a PhD from Purdue University, USA. He is an associate professor. He has 30 years of experience in teaching classes related to logistics for agri-food and biomass, renewable energies for Agriculture and teaches also information technology for undergraduate and graduate students.

He organizes summer school on entrepreneurship of food product innovation. He leaded the use of blended learning pedagogic methods at the University of Turin, is currently a President of the World Association of Agricultural and Biological Engineers. He is adjunct professor at the University of Florida, teaching a course on agrifood logistics.

Abstract

There are new challenges and opportunities for agriculture today, driven by the climate change, the greening of the products and processes, the reuse of side-stream products, the raised complexity of the chain and the increased availability of information.

To successfully address and react to these drivers, agriculture and forestry needs new business models and skills. The identification of existing and emerging skills needs in bio-economy, sustainability and digital technology is of paramount importance in order to develop a strategic approach to keep the European agricultural sector competitive and sustainable in the long term.

The FIELDS approach, starting from the current and future trends and skills needs, will lead to a sustainable European strategy to address these skill gaps. Since agriculture issues and opportunities differs a lot from country to country, the EU strategy will be customised to have a

strategy for 7 countries. It will address country-specific actions, occupational profiles and training material to reflect the country needs while keeping EU quality standards (ESCO, EQAVET, ECVET) to address the mobility of learners through Europe concretely. Complete training made of 4 modules available through the open learning platform: i) common skills and soft skills; ii) sustainability; iii) bioeconomy and iv) digitalisation.

FIELDS goal is to delivery human capital solutions to supply food systems and bioeconomy chains, through the establishment of an Agriculture and Forestry Sector Skill Alliance. It will be established during the project to build upon the regulatory frameworks and opportunities at EU and country level, while proposing concrete and practical initiatives to address skills challenges, in particular through offering modular training inside the project while guaranteeing mobility of workers within the agriculture, forestry and agri-food industry.

FIELDS project takes an innovative approach to analyse the skill needs, through scenarios analysis, focus groups, and innovative curricula, including state of the art on new methodologies. The focus groups aim at identifying skill needs and future trends in agriculture, forestry and related sectors, by collecting information and qualitative data about:

- Identified needs in agriculture and forestry. Needs will be classified into 4 main categories: sustainability, digitalisation, bio-economy and soft skills.
- Industry needs: extrapolate required skills in agriculture and forestry-based also on industry needs;
- Existing training in response to identified needs, and missing practice for the identified needs.
- Best methods to deliver training to each target group.

The multi-stakeholder approach in the FIELDS project, with 30 partners from 12 countries (HEI, VET providers, agricultural and forestry sector representatives and agri-food industry), will allow tackling the complexity of the issues EU agriculture faces today.

SYMPOSIUM INTERNACIONAL SOBRE TECNOLOGÍAS ALIMENTARIAS
FOOD TECHNOLOGY INTERNATIONAL SYMPOSIUM

Tuesday, 18th May 2021

Water Technologies: iWatermap project

Chairs: Pieter de Jong and Ana Belen Morales

10:00 / 10:10 h **Welcome / Introduction**

10:10 / 10:25 h **LIFE ENRICH. Enhanced Nitrogen and phosphorus Recovery from wastewater and Integration in the value Chain.**
Mª Mar Castro García. EMUASA, Spain

10:25 / 10:40 h **Inorganic, selective and low-cost removal of anionic compounds (NO3-) in polluted water and subsequent recovery.**
Ricardo Martínez Vives. Useful Wastes S.L., Spain

10:40 / 10:55 h **Process filtration; from waste to value.**
Jos van Dalfsen. Wafilin Systems, Netherlands

10:55 / 11:10 h **Regenerated membranes: an opportunity for table olives production wastewater treatment. Life SOLIEVA Project.**
Sandra Meca Fàbrega. EURECAT, Spain

11:10 / 11:30 h **Break**

11:30 / 11:45 h **Safe wastewater reuse: REWATER project and agreement CTNC-ESAMUR.**
Sofía Martínez López. CTNC, Spain

11:45 / 12:00 h **Turning food and agricultural waste into a resource for removing Emerging Pollutants from wastewater. Life Clean Up Project.**
Paola Fini. National Research Council CNR-IPCF, UOS Bari, Italy

12:00 / 12:15 h **Contaminants of emerging concern in reclaimed water used for agricultural purposes.**
Laura Ponce Robles. CEBAS-CSIC, Spain

12:15 / 12:30 h **NEOWork, an IT platform to quantify the Water Footprint in the integrated water cycle for food, applying Blockchain and Internet of Things technologies.**
José Ángel Noguera Arnaldos. Proasistech Smart Solutions, Spain

12:30 / 12:45 h **Circular water management in the agri-food industry through innovation.**
Andrés Pascual Vidal. Food for Life Spain Platform PTF4LS, Spain

ONLINE POSTER SESSION

12:45 / 13:00 h **Questions**

SECOND SESSION.
TUESDAY 18th MAY 2021.
WATER TECHNOLOGIES:
IWATERMAP PROJECT

2.1.

LIFE ENRICH. ENHANCED NITROGEN AND PHOSPHORUS RECOVERY FROM WASTEWATER AND INTEGRATION IN THE VALUE CHAIN

Mª Mar Castro García

EMUASA, Spain

Mª Mar Castro Garcia has a degree in Chemical Sciences from the University of Vigo and a Master´s degree in Water Resources Management and Administration from the University of Murcia. Since 2008 she worked as technician for Aquatec Projects in the Water sector, managing R&D projects and calculating the Carbon Footprint of water and wastewater treatment facilities. Since 2019 she has been working as R&D technician for Emuasa, the company managing the Urban Water Cycle in Murcia municipality (Region of Murcia, Spain).

Abstract

Resource recovery from waste streams deals with United Nations Sustainable Development Goals 6 and 11. It is a major goal of interest due to the alarming increase in worldwide pollution levels and raw materials depletion mainly caused by the overuse of fossil fuels and natural resources; hence, putting high demand on turning wastewater treatment plants (WWTP) into wastewater resource recovery facilities (Biorefineries). An issue for long term global food security is the sustainable supply of phosphorus (P), a key resource for soil fertilization that cannot be substituted. Hence, the proper management of its reserves is a global concern as its scarcity is expected to take place in the next decades. Currently, the best estimates in the wastewater treatment sector show that around 3.000 tons/year are produced in Europe, that could be recovered as struvite from streams with high inorganic P, i.e. phosphates (PO_4), concentration. The agricultural sector consumes also large amounts of nitrogen as fertilizers. The production of nitrogen (N) through the Haber-Bosch process is associated with a negative environmental impact due to its high energy demand. However, nitrogen recovery figures are insignificant today, i.e. the current practice in WWTP is its removal into the gas phase as N_2. While WWTP are an important source for the recovery of these elements, their recovery rates today are still very low. A promising way to mitigate the challenges associated to the sustainability of the resource is to produce high-quality fertilizers with recovered P and N in the form of struvite and ammonium salts.

The LIFE ENRICH project, started in September 2017, with a duration of 4.4 years and a total budget of 2,789 million€, is led by the Centro Tecnológico del Agua (Cetaqua) and the partners involved are: Instituto de Investigación y Tecnología Agroalimentaria (IRTA), Irrigation community Aigües del Segarra Garrigues (ASG), Empresa Municipal de Aguas y Saneamiento de Murcia (EMUASA), Universitat Politècnica de Catalunya (UPC) and Universitat Politècnica de València (UPV).

The project is allowing the full-scale validation of a technology that will allow the recovery of N and P to produce fertilizers. The nutrients obtained will be analyzed in detail and mixed to obtain optimal products for use in crops, promoting a circular economy model.

Preliminary tasks have included the design of a new treatment train in Murcia Este WWTP (100,000 m^3/day), managed by Emuasa. Once the optimal configuration of sludge line in terms of P recovery has been identified, both from a technical and economic point of view, the plant has been remodeled and is currently operating under the new treatment conditions. Three pilots are being operated simultaneously, fed with different effluents from the plant, to produce struvite and ammonium salts.

2.2.

INORGANIC, SELECTIVE AND LOW-COST REMOVAL OF ANIONIC COMPOUNDS (NO_3^-) IN POLLUTED WATER AND SUBSEQUENT RECOVERY.

Ricardo Martínez Vives.

Useful Wastes S.L., Spain

Entrepreneur, deeply committed to the circular economy. Agri-Food Engineer, Master in Chemical Sciences, PhD student in Industrial Engineering specialized in Chemical Engineering.

In 2016 Ricardo created Useful Wastes where he is the largest shareholder and works to improve the environment. Winner of various research awards for his work with brines (Botín Foundation, IIAMA (Institute of Water and Environment Engineering), Tomás Ferro International Foundation, Aquae Foundation, he continues to seek ways to help the planet and create wealth.

Abstract

The bodies of water and aquifers in the southeast of Spain have suffered high pollution caused by the indiscriminate use of fertilizers in intensive agriculture or livestock, as well as industrial development that from leaks or spills has significantly damaged the quality of the most precious asset. In the Valencian Community it is estimated that more than 200,000 people live in areas with polluted water.

Further south, in Campo de Cartagena we have witnessed one of the biggest environmental disasters in the country. For more than 25 years there has been a reconcentration of salts in the aquifer that covers the subsoil of this area that later went to the largest salty lagoon in Europe, the Mar Menor. Therefore, we have witnessed large episodes of death of the native living beings of the lagoon caused by the anoxia produced by the hyper eutrophication of algae due to the continuous discharge of high amounts of NO_3^- present in the aquifer.

The presence of NO_3^- in the water not only causes this eutrophication, but also causes diseases such as the lack of oxygen in the blood due to the transformation of hemoglobin to methemoglobin by the action of nitrites (reduced by the body from NO_3^- to NO_2^-). When methemoglobin reaches concentrations greater than 79%, anoxia occurs, presenting problems in neonates and babies since it causes “blue baby syndrome” that can cause death.

The exhibition of this work is the elimination of NO_3^- through a low-cost filter medium (adsorption), totally selective with NO_3^- despite the presence of other anions. In this way the NO_3^- are retained allowing after desorption to obtain HNO_3 which is later used as Arthrospira maxima (Spirulina) fertilizer.

2.3.
PROCESS FILTRATION; FROM WASTE TO VALUE

Jos van Dalfsen
Wafilin Systems, Netherlands

Jos van Dalfsen has over 10 years' experience in research and development and project management involving membrane technology. After obtaining his bachelor degree at the Applied University of van Hall Larenstein he started his career at Wetsus, Centre of Excellence for sustainable water technology. Since 2017 he holds a position as R&D Manager at Wafilin Systems. In this position he collaborates in close contact with customers from the Food and Dairy industry who are searching for a unique membrane solutions. Their process applications focus on protein recovery, sugar fractionation, water reuse and energy reduction. Wafilin Systems offers its services and technology to customers using their Food and Water Application Centers at the WaterCampus, which enables them to test and develop solutions for customers and partners.

Abstract

Wafilin Systems, Dutch Water-Innovator of the Year 2020, brings over 40 years of experience in designing specialized membrane-based solutions for high-efficiency applications in the food & beverages and dairy industries. It is our mission to deliver technology concepts to reduce the costs of complex processes and unlock hidden values for higher profitability and growth.

We help companies to integrate effective membrane process technologies to:

- Reduce the amount of (waste) water
- Reuse of treated process water
- Recover resources from process water
- Recover energy from process water
- Enhance product quality

More than ever water is a critical resource where increasingly demanding environmental requirements have given rise to new technologies and working practices to create a more sustainable way of treating and reuse (waste)water and its components. Wafilin Systems has a broad experience and application know-how within a wide range of industries, designing the most appropriate solutions to reduce, reuse and recover (waste) water.

We provide turnkey services encompassing the full range of support with best technical knowledge, which includes R&D, feasibility studies, pilot testing in our laboratories or at location, process design, and delivery of membrane filtration units and systems.

With our independent approach we can offer a wide variety of membrane solutions to our clients. Wafilin Systems offers a wide variety of membranes such as microfiltration, ultrafiltration, nanofiltration and reverse osmosis.

Typical membrane applications focus on protein recovery, fractionation of sugars, water reuse and energy reduction. During this presentation process applications will be highlighted and examples of best practices in membrane filtration will be presented and discussed.

2.4.

REGENERATED MEMBRANES: AN OPPORTUNITY FOR TABLE OLIVES PRODUCTION WASTEWATER TREATMENT. LIFE SOLIEVA PROJECT

Sandra Meca Fàbrega
EURECAT, Spain

Sandra Meca Fàbrega. Head of Waste and Circular Economy line (UT Waste, Energy and Environmental Impact, Sustainability Area). Holds a degree in Chemistry (2002) from University of Barcelona (UB) and Ph.D. (2009) from Technical University of Catalonia (UPC). She works at Eurecat, Centre Tecnològic de Catalunya since 2009. She has strong expertise in waste valorisation, chemical processes and water treatment.

Abstract

Table Olive Production Wastewater (TOPWW) contains water, salts, and organic compounds among others. These products are of great interest in circular economy, specially salts and water which can be reintroduced in the production line and polyphenols (part of the organic matter) which are emerging nutraceuticals. LIFE SOLIEVA aims to provide an innovative technological scheme to separate and recover these products of interest closing a loop in circular economy and reducing the economic and environmental impact of the production of table olive. The technological scheme is divided in two sections: the recovery of organic compounds and the recovery of salts. However, for these two technological sections to succeed, separation of these components needs to be carried out.

This presentation focuses on the membrane stage aiming to separate salt and organic matter. The key for organic matter and salt separation is to select the most suitable membrane. In SOLIEVA, tailor-made membranes are produced by regenerating end-of-life RO membranes.

First, studies on organic matter fractionation little separation between polyphenols and other organic compounds contained in TOPWW. Then, efforts were focused on separation of organic matter from salts requiring NF-type membranes for this separation.

Membrane regeneration process was investigated to evaluate the effect of oxidising agent dose on permeability and rejection and define regeneration conditions to obtain NF-type membranes form end-of life membranes.

Performance of regenerated membranes was evaluated and compared with commercial NF membranes, polymeric and ceramic type. Results showed that the use of regenerated membrane allows better separation of organic matter in comparison with commercial NF270, applying lower pressure thus consuming less energy. achieved a lower EC rejection (around 12%).

2.5

SAFE WASTEWATER REUSE: REWATER PROJECT AND AGREEMENT CTNC-ESAMUR

Sofía Martínez López

CTNC, Spain

Graduate in Biotechnology from the Miguel Hernández University of Elche (UMH). Predoctoral researcher in Industrial Technologies at the Polytechnic University of Cartagena (UPCT). Since 2017, R&D technician in the Environment Department of the National Technological Center for the Food and Canning Industry CTNC.

Abstract

The recent REGULATION (EU) 2020/741 of the European Parliament and of the Council on minimum requirements for water reuse considers other parameters not covered by the previous RD (RD 1620/2007), making the specific quality requirements, especially from a microbiological and sanitary point of view, more restrictive.

The Region of Murcia is a European leader and, together with Israel, a world leader in the treatment and reuse of reclaimed water, reusing up to 97% of the region's total treated water.

It is therefore logical to think that the implementation of the new regulation will directly affect the region's WWTPs. Primarily because the disinfection systems commonly used, generally chlorination, and to a lesser extent ultraviolet, are not effective in eliminating Clostridium perfringens spores, which are highly resistant to biological, physical, and chemical treatments. Secondly, because current treatment technologies do not allow the complete elimination of emerging pollutants, so that even in low concentrations they are continuously discharged into the environment through treated wastewater. And finally, because most current disinfection technologies, such as chlorination, involve the addition or generation of toxic disinfection by-products to the water, such as chlorates, trihalomethanes or haloacetic acids. CTNC is working to address the challenge of safe wastewater reuse, in compliance with the new regulation, through different lines of action.

On the one hand, through **REWATER project**, the quality of the treated wastewater generated by the agri-food industry in the Region of Murcia, which due to its characteristics is susceptible to reuse, has been evaluated in relation to the requirements of the new European regulation on reuse. This study has provided information on the status of treated water from the agri-food sector in terms of the content of Clostridium perfringens spores and other chemical and microbiological pollutants included in the Regulation. In addition, different technologies, or combinations of them,

easily implemented on an industrial scale, have been studied and tested for the disinfection of water, eliminating C. perfringens spores, as well as eliminating other possible types of pollutants.

On the other hand, CTNC works closely with the Administration in charge of management and treatment in the Region of Murcia, within the Regional Ministry of Water, Agriculture, Livestock, Fisheries and Environment of the Autonomous Community, through an **agreement with ESAMUR**. For years, work has been carried out on the monitoring and control of the evolution of pollutants of emerging concern and pathogenic microorganisms in wastewater, from the time it enters the WWTP until it is used as agricultural irrigation water. Likewise, the implication of this reclaimed water, as well as sewage sludge, in agricultural land application, and the possible transfer of pollutants and pathogens in the soil-plant system has been evaluated.

2.6.

TURNING FOOD AND AGRICULTURAL WASTE INTO A RESOURCE FOR REMOVING EMERGING POLLUTANTS FROM WASTEWATER. LIFE CLEAN UP PROJECT

Paola Fini

National Research Council CNR-IPCF, UOS Bari, Italy

Her research work is focused on environmental, biomedical and food processing applications. She is an expert in many analytical techniques, as well as the co-author over 80 papers and a number of other publications (conference proceedings, book chapters etc.) and contributing to many conferences.

Abstract

Currently, emerging contaminants are a matter of great concern about water pollution. The high interest towards these compounds is due to the high risks they confer to the aquatic ecosystem, even though they are present at low concentrations. Emerging pollutants include personal care products, drugs, pesticides and solvents, which are persistent, potentially carcinogenic and endocrine-disrupting even for humans. More specifically, medicines are considered a worrying class of emerging pollutants (EPs) since they induce a physiological response affecting both non-target individuals and species. About this concern, although there are no legal discharge limits for these pollutants, some regulations have been published, and the Directive 2000/60/EC was the first mark in the European water policy, which established a strategy to describe high risk substances to be prioritized. Among pharmaceutical compounds, Diclofenac (DCF) and Tetracycline (TC) are still most frequently detected pharmaceuticals in the water environment. So, this work reports the use of chitosan films and olive pomace as agricultural/food wastes, and the blend of these adsorbents, to remove and recover, through bio-sorption processes, the emerging pollutants from water. The literature gap about the use of chitosan films and olive pomace for adsorbing emerging pollutants from water has been covered, although chitosan films and the pomace were already used for dyes and heavy metals removal. Further, the possibility of recycling both the pollutants and the adsorbents, globally reducing the environmental impact, could be considered in the perspective of a virtuous cycle. Several parameters affecting the pollutants adsorption process, such as the pH and ionic strength of solutions containing DCF and TC, the bio-sorbent and pollutant amount, and the temperature values, were investigated. The kinetics and the adsorption isotherms, along with the thermodynamic parameters ($\Delta G°$, $\Delta H°$ and $\Delta S°$) were also evaluated. The Freundlich and Temkin isotherms well described the process. Experiments of the complete desorption were also performed by using salts solutions, recycling the pollutant and the bio-sorbent lowering the associated costs. The adsorbent versatility was also reported, exploring the possibility of photodegrading the pollutants with AOPs.

2.7.

CONTAMINANTS OF EMERGING CONCERN IN RECLAIMED WATER USED FOR AGRICULTURAL PURPOSES

Laura Ponce Robles
CEBAS-CSIC, Spain

Ph.D. in Advanced Chemistry from the University of Almería (2018), she has received several awards such as "The International Ph.D. on Advanced Oxidation Processes Label" (2019). Her professional activity began in January 2014 in the Water Treatment department of the Plataforma Solar de Almería (PSA). Currently, it is part of the Irrigation Group of the Centro de Edafología y Biología Aplicada del Segura (CEBAS), of the Spanish National Research Council (CSIC), developing a line of research based on the development of comprehensive water purification and regeneration systems that ensure the total elimination of pollutants of emerging concern, obtaining quality reclaimed water so that its subsequent use in agriculture does not entail any type of environmental or health risk.

Abstract

The use of reclaimed wastewater in agricultural practices has recently received increasing attention as a possible solution to water scarcity. Although agricultural reuse is accompanied by a high number of benefits (fertilizer saving, effluent control, etc.) several important questions are still unanswered and barriers exist regarding the safe and sustainable reuse practices. In this sense, the presence of contaminants of emerging concern (CECs) in reclaimed water can be critical, as these chemicals can be uptaken in irrigated crops and eventually ingested during food consumption. In fact, although the current legislation related to wastewater treatment (Directive 2000/60/EC, Directive 2008/56/EC, Directive 2013/39/EU) and reuse (R.D. 1620/2007, (UE) 2020/741) not include most of these compounds, they are included in the priority research lines of several national and international organizations such as the World Health Organization (WHO), the United States Environmental Protection Agency (EPA) or the European commission.

So, detailed studies on two key issues are needed: a) wastewater treatments for CECs removal in wastewater treatment plants (WWTP) before irrigation; b) fate and accumulation of CECs in real crops irrigated with reclaimed water.

About the first question, the presence of CECs in WWTP effluents is a matter of growing concern due to conventional treatments are not specifically designed to eliminate them. Therefore, several technologies are currently being studied as advanced tertiary treatments. Among the available options, ozonation, adsorption using activated carbon and heterogeneous photocatalysis using

TiO_2 are the most popular. Although all these techniques have demonstrated high CECs removal, the efficiency depending on the wastewater characteristics, the concentration of CECs, their physic-chemical properties and the treatment conditions.

Regarding the second question, monitoring the fate and accumulation of CECs in crops it is essential to assess the potential risk of this exposure route on human health. In general, crops where irrigation is practiced a long-term or in summer periods (high water needs) have high potential for CECs absorption. In addition, leafy vegetables (such lettuce) can accumulate higher concentrations of CECs in their edible tissues.

Both questions are being investigated specifically in the REUSAGUA and DIRELMIVID projects (funded by Consejería de Empresa, Industria y Portavocía of Government of Murcia destined to the strategic projects of RIS3Mur under the European Regional Development Fund ERDF 2014–2020). In both projects, different pilot plants have been installed as viable alternatives for CECs removal in conventional WWTP located in the Murcia Region. In addition, effluents from the pilot plants were used for irrigation of real crops and the absorption capacity of CECs in the soil-plant system has been evaluated. The results have shown minimal health risks in terms of the intake of CECs from crops irrigated with regenerated water.

2.8.

NEOWORK, AN IT PLATFORM TO QUANTIFY THE WATER FOOTPRINT IN THE INTEGRATED WATER CYCLE FOR FOOD, APPLYING BLOCKCHAIN AND INTERNET OF THINGS TECHNOLOGIES

José Ángel Noguera Arnaldos
Proasistech Smart Solutions, Spain

Ph. D. in Computer Science and Electronics engineering (Murcia University). Director of Innovation at company Know Systems.

Extensive experience in Internet of Things technologies and machine learning applied to integrated water management.

Abstract

Water eco-efficiency indicators (Water Footprint) enable sustainable water management in the industrialization of agricultural products. They provide the necessary information to enable the implementation of a reduction in production costs in the agrifood industry (from field cultivation to the marketing of processed food), since they make it possible to reduce the volumes of water used throughout the process with the consequent economic savings that this entails. To this end, the implementation of Internet of Things and Blockchain technologies enables the traceability of these indicators.

The establishment of a water efficiency program, through eco-efficient water management indicators in the production of agro-processed products, allows the implementation of a control and evaluation system for companies in the agrifood industry through which they will be able to establish sustainable water management. It also facilitates a just ecological transition in the use of a scarce resource such as water.

Water eco-efficiency indicators in food production had intended to promote both product quality and safety. To meet social demands and needs related to the production and processing of sustainable, safe and quality agrifood products and to enhance the competitiveness of agrifood sector companies so that they can achieve greater international projection.

Results of project “ENVIRONMENTAL ECO-EFFICIENCY INDICATORS (WATER FOOTPRINT) AS A QUALITY PARAMETER IN PRODUCTION AND MARKETING OF AGRIFOOD PRODUCTS” financed within the aid to operations for the “support for the creation and functioning of operating groups of the European Association for innovation in agricultural productivity and sustainability” from 16.1 measure Rural Development Program of the Region of Murcia 2014-2020. 2nd call, year 2018.

2.9

CIRCULAR WATER MANAGEMENT IN THE AGRI-FOOD INDUSTRY THROUGH INNOVATION.

Andrés Pascual Vidal

Sustainability Working Group of PTF4LS, Spain

Agriculture Engineering by Polytechnic University of Valencia, specialty in Food Industries. +23 years experience in R+D+I area for food and environment sectors. Former head of environment and bioenergy department, he is now Innovation Director at AINIA technology center based in Spain formed by +700 company members mainly from agro food sector. He is chair of the Sustainability Working Group of Food for Life Spain platform (PTF4LS), member of the EHEDG executive committee, a global organization on hygienic engineering and design.

Abstract

The agri-food industry faces the challenge of meeting consumer demand sustainably by decoupling economic growth into resource use and avoiding negative effects on the natural environment. Sustainable water management is key to the industry. The availability of sufficient and quality water is going to be a limiting factor that limits food production globally. Due to population growth and higher food production, water demand is estimated to increase by 40% over current demand over the next 20 years. The agri-food sector will adopt circular economy models and achieve the disappearance of the concept of "waste" water in a new scenario where liquid flows generated in production plants will be considered as "secondary raw materials". For this purpose, the application of plant water recycling measures, recovery and reuse of plant water, as well as the regeneration and reuse of end-of-line water, will be key. The industry also proposes some pre-reuse strategies such as the redesign of production processes, equipment and facilities. An example is the application of hygienic design guidelines (EHEDG standards) in the design of machinery and processing lines that significantly facilitate cleaning and disinfection. Another example is the use of cleaning and disinfection products with less environmental impact that facilitates subsequent reuse. There are also opportunities to recover and reuse water, with or without treatment, contained in raw materials (e.g. milk) or provided that the hygienic requirements of food are met. The organic matter of wastewater can be valued in the form of biogas, to high value-added compounds that can be separated and exploited as sugars, proteins, lipids, polyphenols, etc. The tendency is to consider wastewater as the raw material of biorefinery processes by fractionating and recovering for use each component of interest water. Finally, the regeneration of the purified waters at the end of the line for reuse in fertigation of farms near the industrial plant is also a great opportunity for the future. Innovation and technology are the engine of change that must enable the development of the circular

economy and save barriers to optimize water management in agri-food industries and allow the linear model of using and eliminating water pollutants to be changed to circular models where water use is optimise and the concept of wastewater is abandoned, liquid currents to be considered valuable resources.

SYMPOSIUM INTERNACIONAL SOBRE TECNOLOGÍAS ALIMENTARIAS
FOOD TECHNOLOGY INTERNATIONAL SYMPOSIUM

Wednesday, 19th May 2021
New trends, experiences and opportunities
Chairs: Eduardo Cotillas and Pedro Abellán

10:00 / 10:05 h **Welcome / Introduction**

10:05 / 10:20 h **Real Time Global Traceability System for Food Contact Plastic Packaging. BlockChain and Active Digital Identification. Simple. Fast. Sure.**
Fuensanta Monzó Sánchez. CETEC, Spain

10:20 / 10:35 h **My international project experiences.**
Yıldıray İstanbullu. Central Research Institute of Food and Feed Control CRIFFC, Turkey

10:35 / 10:50 h **A platform-based collaborative service model to foster a more sustainable food production system.**
Henrik Stamm Kristensen. Blendhub, Spain

10:50 / 11:05 h **Food fraud detection.**
Beatriz Carrasco. Chemometric Brain, Spain

11:05 / 11:20 h **Virus and food safety.**
Gaspar Ros. University of Murcia, Spain

11:20 / 11:30 h **Break**

11:30 / 11:45 h **Food Print Revolution.**
José Alfonso García Escribano and Patxi Larumbe Beramendi. COCUUS, Spain

11:45 / 12:00 h **Mintel Food & Drink Trends 2021.**
Agustina Dapena. MINTEL, United Kingdom

12:00 / 12:15 h **Climate-smart Practices in Agriculture: The smartROOT Project.**
Panagiotis Sarigiannidis. University of Western Macedonia, Greece

12:15 / 12:30 h **Improved Support to Entrepreneurial Development in Rural Areas of Azerbaijan.**
John Toner. CTNC Senior Expert, Azerbaijan

12:30 / 12:45 h **Collaboration opportunities between Turkish and Spanish agrofood companies and Research centres.**
Fetullah Bingül. TARIMAS, Turkey

12:45 / 12:55 h **Possibilities of collaboration of Romanian and Spanish companies and research centres within the frame of Horizon Europe.**
Ileana Iorga and Sorin Iorga. IBA, Romania

ONLINE POSTER SESSION

12:55 / 13:00 h **Questions**

THIRD SESSION.
WEDNESDAY 19th MAY 2021.
NEW TRENDS, EXPERIENCES AND OPPORTUNITIES

3.1.

REAL TIME GLOBAL TRACEABILITY SYSTEM FOR FOOD CONTACT PLASTIC PACKAGING.

BLOCKCHAIN AND ACTIVE DIGITAL IDENTIFICATION. SIMPLE. FAST. SURE.

Fuensanta Monzó

CETEC, Spain

She got a degree in Chemistry from Complutense University of Madrid and obtained a PhD in Industrial Technologies from the Technical University of Cartagena. She joined CETEC Plastic and Footwear Technological Center as head of the plastic, elastomers and footwear materials characterization laboratory, and currently holds the position of R&D project manager and senior researcher in CETEC.

Abstract

With Ecotrace you will know what, where, when and who has collected the plastic used in the manufacture of food packaging.

Ecotrace informs you on who, where, when and how much of the collected plastic has been recycled and transformed.

Ecotrace identifies the type of products into which plastic waste from food packaging has been converted or incorporated and what percentage of it is recycled.

Ecotrace allows to guarantee the fulfilment of quality standards, milestones and processes in real time automatically, without interfering in the normal operation of the food packaging company.

Ecotrace allows you to publish online information on the compliance of user companies with the regulations on plastic recycling and Circular Economy.

Ecotrace allows the end user of the food packaging to have information in real time about the measures and processes used by the manufacturer of the packaging to ensure the maintenance of the environment and the elimination of plastic waste in our environment

3.2.
MY INTERNATIONAL PROJECT EXPERIENCES

Yıldıray İstanbullu
Central Research Institute of Food and Feed Control

He is the director of Central Research Institute of Food and Feed Control in Bursa. He graduated from food engineering department at Gaziantep University and completed his master degree at Uludag University. He continues his doctoral studies at Bursa Technical University.

Abstract

International projects (FAO, EU, GEF, UN-funded projects etc.) aim at bringing together stakeholders from different countries conducting research on a specific subject in order to carry out their work within the framework of a common program and to ensure a permanent cooperation. These projects are highly comprehensive and time-consuming so an involvement of experienced people in the project ensures the expected quality of the project and completing on time. A well-equipped team, an idea born of need, a well-planned process are integral features of a good project. In this presentation, I will firstly introduce my institution and share my years experiences related to international projects such as POST-HARVEST, EYE-BREAD, AGRI-FOOD and FOODTR that I took part in. I hope that these experiences will expand your awareness and guide you to write and join a project.

3.3.

A PLATFORM-BASED COLLABORATIVE SERVICE MODEL TO FOSTER A MORE SUSTAINABLE FOOD PRODUCTION SYSTEM

Henrik Stamm Kristensen.

BLENDHUB, Spain

Henrik Stamm Kristensen, founder of Blendhub, Portable Powder Blending (PPB) and Chemometric Brain, a Dane who has lived in Spain for almost 30 years, has spent his entire professional career in the agri-food sector. He was visionary to anticipate current challenges in the global food industry by developing the world's first multilocalized network of food production hubs.

Abstract

Blendhub is the result of five agri-tech companies founded by Henrik Stamm Kristensen. The company has evolved from the production of food ingredients to become a technology and food-as-a-service platform to help food companies and brands develop and launch products faster, address new markets and compete on innovation without the need for investment or proprietary infrastructure, through a network of multilocalized hubs in Spain, India, Mexico, Colombia and Thailand.

How can we ensure a safer, more sustainable and healthier food system? Which path should the food industry take to meet current challenges on environment protection, demographic growth and resource management?

Centralized production is inefficient: big conglomerates dominate the industry, but they respond to less than 20% of the global food production. Meanwhile, SMEs produce and distribute 80% of the food available. And they get little to no support in R&D, technology and processes. Ingredients that could be sourced locally often must travel long distances to reach manufacturing centers. Besides adding costs and increasing the final prices of products, transportation implies the use of massive amounts of fossil fuels that contribute to gas emissions.

Blendhub's solution to tackle these issues is a collaborative platform-based business model to offer food-as-a-service. The company built a localized production model, closer to raw materials and final consumers, through a network of production hubs, portable factories that are developed and installed according to a unique replication model designed by Blendhub, which are transported in a 40-foot container and are operational anywhere in the world within six months. By implementing this multi-localized food production model, Blendhub aims at streamlining global supply chains, making them more efficient and more environmentally friendly, producing cheaper, faster and safer, and thus making food accessible to more people in more places.

3.4
FOOD FRAUD DETECTION

Beatriz Carrasco
Chemometric Brain, Spain

Beatriz Carrasco holds a PhD in Physical Chemistry from the University of Murcia and she was awarded the extraordinary PhD prize in 1998. She then obtained a postdoctoral fellowship at the same university and during this time she published more than 30 scientific articles. In 2004 she joined Blendhub and, as the head of Quality, she developed Chemometric Brain. Dr. Carrasco has been working in NIR spectroscopy since 2008 and carried out several R&D projects on authentication and homogeneity of mixtures. Since January 2020, she is Chief Technology Officer at Chemometric Brain.

Abstract

Chemometric Brain is a pioneering quality control software based on NIR technology that allows to identify the components of any ingredient or food product in powder, liquid, solid or gel in just a few seconds using advanced techniques such as qualitative and quantitative NIR analysis, Machine Learning and AI and hosting more than 100 libraries of products in a unique of its kind cloud-based platform. After more than a decade developing a cloud-based digitized quality control of supply chains around a global network of production hubs, Chemometric Brain became an independent company in 2020 due to significant interest from many organizations to adopt this technology.

Digitizing food quality control is key to face global challenges in the food industry: increasing food fraud, changing diets towards a more individualized nutrition, fragmentation of the food industry, with SMEs having little access to technology; and unsustainable supply chains. The food industry cannot ignore the global trend to digitization and needs digitized and simple tools to verify food quality, origin and deviations, facilitating global agreements between stakeholders.

After years of research and successful implementation in the ingredients and blending level of the food industry, Chemometric Brain is expanding to make this technique accessible to any food company in a software-as-a-service model to ensure a maximum level of traceability and security of raw materials and food products throughout the entire supply chain.

3.5.
VIRUS AND FOOD SAFETY

Gaspar Ros Berruezo
University of Murcia, Spain

Gaspar Ros, Professor of Food Safety Risk Analysis and Food Hygiene, Inspection and Control at the School of Veterinary and Food Science and Technology (FVETUM), Dean of FVETUM since 2016, former President of the Scientific Committee of the Spanish Food Safety and Nutrition Agency. Leader of the Research Group of Human Nutrition and Food Science of the University of Murcia. Fulbright Scholar at the University of Tennessee in 1989-90. Visiting Professor at several Universities. 35 years of research experience in functional food and ingredients based on their bioavailiaity. Leader of a large number of regional, national and EU competitive projects and R&D grants with agro-food companies.

Abstract

Over the past 20 years, reports of foodborne illness outbreaks caused by viruses have steadily increased, thus being identified as a very serious known and emerging threat to overall global health, that also gain It has increased with the COVID pandemic and its potential danger in transmission via food. Although scientific information on viruses published in scientific journals is increasing, there has been little guidance on effective mitigation strategies and risk assessments provided for the industry with the exception of some food sectors such as seafood processing or seafood services. feeding. Furthermore, there is a risk that the detection of new and emerging viruses may be implicated in outbreaks of foodborne illnesses of insufficiently known etiology.

Understanding that many of the current food safety measures in the world may not be effective to prevent enteric viral diseases, the panel of experts of the WHO and FAO, since 2008, have indicated to us the population, health authorities and scientists an extensive list of viruses transmitted by food and with worldwide distribution, focusing on criteria such as the health and economic costs of the disease, its prevalence, the level of difficulty in its control and the impacts on trade. The final list included hepatitis A virus (HAV), human norovirus (HuNoV), and human rotavirus (HRV), along with some emerging viruses of concern such as hepatitis E virus (HEV), highly avian influenza. pathogen (HPAI-H5N1), SARS-coronavirus and Nipah virus. The group also identified food product-virus pairs based on current knowledge. The most important were HuNoV and VHA in bivalve mollusks (including oysters, clams, cockles and mussels), fresh produce and prepared foods. Finally, the expert panel identified three main routes of viral contamination of food: sewage and human feces, infected food handlers, and animals (in the case of zoonotic viruses).

Lack of knowledge about foodborne viruses has been a limitation in conducting a quantitative microbial risk assessment (QMRA). Thus, for example, HuNoV has been particularly difficult to evaluate because it cannot be propagated in cell culture, which has historically limited investigations to molecular testing and the use of culturable surrogate animal viruses.

3.6.
FOOD PRINT REVOLUTION

José Alfonso García Escribano
CEO COCUUS

Patxi Larumbe Beramendi
Founder and CCO COCUUS

José Alfonso García, with a law degree and several masters - MBA, Commercial and Marketing Management- has relevant national and international management experience in companies from different sectors.

Patxi Larumbe has a long track record and experience in the fields of industrial machinery design, laser technology, 3D and inkjet. He also has a background in business management, having successfully set up and managed several companies with sales in excess of 10 million euros.

Abstract

- Laser/3D printing

Design and development of laser technology for agri-food morphological transformation.

- Inkjet printing

Design and development of inkjet technology that allows to personalize a beverage or solid food with the desired image or logo.

- Scaffolding: mimetic food

- Construction of structures for industrial growth of meat and fish cell cultures in vitro by 3d printing of bioinks.
- Construction of structures for morphological shaping with products derived from meat, fish and plant based products by 3d printing of bioinks.

3.7.
MINTEL FOOD & DRINK TRENDS 2021

Agustina Dapena
Mintel, United Kingdom

Agustina is Mintel's Account Director for Spain and Portugal, she looks after part of the existing portfolio of clients in the region, helping them innovate, launch new products into the market and make fast and better decisions, based on trusted and robust data.

Abstract

In Mintel we are experts on what consumers want and why, we combine FMCG coverage in 86 markets, with global consumer insights, 45 years of trends spotting and the views of over 200 in-house experts to your business all the tools they need to define your strategy.

Food is the ingredient that really binds up all together, and since the pandemic began we've noticed that food offers so much more than substance, it's something that people have looked for for positivity, for immunity and for community. It has illuminated the inequalities we have in our society and put a spotlight in the fragility of the global supply chain and encouraged us to adopt to new technologies, we've seen grandparents online shopping for the first time. The point is that it has had a huge life changing impact in our lifestyles and companies have looked and are still looking for ways to adapt to this "next normal" as we call it.

So, as a call to action, we've identified 3 trends, 3 ways in which consumer choices and their consumption behavior will change over the next few years. These are based on Mintel's trend Drives, and the three chosen ones for this year are: For Wellbeing, Feed the mind: with a strong focus on mental wellness. For Value, we have Quality Redefined, which looks at how consumer priorities have shifted. And the third one, for Identity, is called United by Food and is about the ability of food to bring people together.

And what I would like to do for the remaining time of the session is to show you what is going on with consumers and what Food, Drink, Retailers and Foodservice companies have been doing so far to address these needs.

FEED THE MIND

32% of UK adults* and 33% of Spanish adults* claim COVID-19 has made them worry for their or their family's stress levels.

There is an opportunity to create rituals around Food & Drink, In China, 77% of adults agree that having a sense of ritual in daily life helps lift mood. The experience of food, drink and foodservice is not limited to sensory appeal. It also includes the processes and behaviors around preparing or consuming a meal or product.

For this trend we will tap into examples of foodservice and campaigns that help connect the physical and online world.

QUALITY REDEFINED

In 2021, consumers will seek value by buying competitively priced food and drink products that deliver on the core needs for: taste, quality, health, trust and safety.

As markets reopen from COVID-19 lockdowns, the pace of life will get busier and consumers will expect affordable time-saving, hygienic and adventurous convenience food, drink and foodservice.

Here we will tap into examples on how Foodservice has explored new ways to gain presence into the e-commerce world with some executions spotted around the world.

UNITED BY FOOD

Consumers will be looking for new ways to connect. 78% of US consumers say technology helps them feel connected with family and friends when they can't see them in person.

Food, drink and foodservice in particular will serve as common interests around which people can form communities, uniting isolated consumers around their shared passion for brands and the values they express.

As with the previous trends, here we will tap into examples of how brands have been successfully creating these communities and the role of social media to layer meaningful interactions in the physical and online experience.

Conclusion:

Food and drink companies will broaden their focus on mental wellbeing solutions, deliver new value needs and use brands to celebrate people's identities.

3.8.

CLIMATE-SMART PRACTICES IN AGRICULTURE: THE SMARTROOT PROJECT

Panagiotis Sarigiannidis

University of Western Macedonia, Greece

Prof. Panagiotis Sarigiannidis is an Associate Professor in the Department of Electrical and Computer Engineering in the University of Western Macedonia, Kozani, Greece since 2016. He received the B.Sc. and Ph.D. degrees in computer science from the Aristotle University of Thessaloniki, Thessaloniki, Greece, in 2001 and 2007, respectively. He has published over 190 papers in international journals, conferences and book chapters. He has been involved in several national, European and international projects. He is currently the project coordinator of three H2020 projects, while he coordinates and participates in several national and Erasmus+ projects related to smart farming and internet of things.

Abstract

Climate change poses a significant threat against agriculture practices all around the globe. Digitalisaton of such sectors promises to resolve environmental issues; however, there is still a lot of work to be conducted towards this purpose. In addition, Higher Education Institutions need to respond by developing new skills and technologies in their curricula. To this end, we aim in increasing digitalisation to support climate-smart practices in agriculture, via the Erasmus+ project "SmartROOT". SmartROOT focuses on the preparation of a new Joint Master Degree program in the field of mixed farming systems by introducing user-friendly ICT tools to improve the resilience of agriculture subject to climate change. It is going to actively involve students in the preparation process, receive their assessment and feedback on the ICT tools and material developed in terms of their operability, the user-friendly environment, the knowledge gained, the extent of international cooperation and the extent of satisfaction of their expectations. It will be a dynamic, inter-active process which ends to a Joint Master Degree program ready to run after the completion of the project. SmartROOT not only aims to prepare the future professionals in the agricultural sector, but also promotes ways for small and medium-sized farms to benefit from the new technologies by introducing and familiarising farmers to digital technologies. Farmers will gain knowledge on methodologies to foster the synergies between agricultural production, climate change mitigation and adaptation.

3.9.

IMPROVED SUPPORT TO ENTREPRENEURIAL DEVELOPMENT IN RURAL AREAS OF AZERBAIJAN

John Toner

CTNC Senior Expert, Azerbaijan

John Toner is a freelance international development consultant, who specialises in economic development initiatives aimed at encouraging business and entrepreneurship. He is currently engaged in a project in Azerbaijan to support entrepreneurship in rural areas coordinated by CTNC.

Abstract

This EuropeAid project is being carried under the auspices of the Ministry of Economy of Azerbaijan and the European Union as part of an overall regional development plan in Azerbaijan. It will contribute to business development and employment generation across all economic regions of the country in order to raise rural livelihoods and the quality of life in rural areas, which will be achieved by supporting the Ministry of Economy of Azerbaijan and its relevant structures to provide improved support for entrepreneurship and SME development in rural areas.

The assignment, which is being implemented by an international consortium (EKVITA Azerbaijan, IKADA Turkey, AVENSA Romania and CTNC Spain) led by CTNC, was launched in May 2019 and is being carried out over a period of 30 months by a team of long-term and short-term experts based in Baku.

The project will operate at two levels. At the institutional level it will develop capacity to encourage more entrepreneurial behaviour from institutions serving rural regions. At the entrepreneurial level it will support the expansion of business development and entrepreneurship programmes into rural areas with an emphasis on links with educational institutions and networks.

The following investment opportunities in agriculture have been detected: Production of fresh fruit and vegetables, Pedigree cattle farms, Poultry-farming, Seed farming and sapling production, Floriculture, Horticulture, Apiculture, Silkworm breeding, Medicinal herbs, Tea growing, Essential (flower) oils, etc.

The following investment opportunities in food processing have been detected: Fruit juices, wine and other alcoholic drinks, Meat and dairy products, Plant and animal oils, Honey, Mineral and natural water, Potato processing (potato chips, potato flour etc.), Canned and frozen fruits and vegetables, Dried fruit, Baking and Confectionery, Nut processing, hazelnut oil, Baby food, Olives and olive products, Tomato paste, mayonnaise, ketchup and other sauces, etc.

3.10.

COLLABORATION OPPORTUNITIES BETWEEN TURKISH AND SPANISH AGROFOOD COMPANIES AND RESEARCH CENTERS

Fetullah Bingül Bursa

Metropolitan Municipality TARIM A.Ş.

General Manager of Bursa Metropolitan Municipality Tarım A.Ş. since 2017. He has been a senior executive for more than 15 years in private sector. In addition, he undertook duties in the establishment and execution of quality management systems.

Abstract

Bursa has large and fertile agricultural areas, so there is a wide variety of products. At the same time, Bursa is in an advantageous position as it is geographically close to the importer countries in order to deliver these high quality products to the world market. Spain, on the other hand, is one of the most important supplier countries of the European fruit and vegetable market and is taking important steps in spreading digital commerce in agriculture. Since both countries are important countries in agriculture, there are many opportunities for cooperation. The presentation will start with the introduction of Tarım A.Ş., and then the products of Bursa will be introduced. Then it will be referred to the agri-food trade between Spain and Turkey. Opportunities for direct cooperation to eliminate intermediaries in the agricultural chain will be mentioned. And research and development (R&D) and commercial cooperation between the two countries in the field of agriculture will be explained. Finally, our international projects with Spain will be introduced.

3.11.

POSSIBILITIES OF COLLABORATION OF ROMANIAN AND SPANISH COMPANIES AND RESEARCH CENTRES WITHIN THE FRAME OF HORIZON EUROPE

Ileana Iorga and Sorin Iorga.
IBA Bucharest, Romania

Corneliu Sorin Iorga, PhD, managed more than 7 multi annual projects in the last 15 years, including transnational projects, addressing both urban and rural areas. He is representing IBA in the Ministry of Agriculture working groups on Food waste management, Good practices in marketing and in the Rural Development National Program 2014 – 2020 working group. He coordinated the Food Department project on food waste, from the 2015-2018 ADER funding program. He also coordinates the project on regional circular economy, from the 2019-2022 ADER program. He published 17 scientific articles in ISI or IDB publications on food waste, circular economy, rural communities' welfare.

Abstract

Centro Tecnológico Nacional de la Conserva y Alimentación (CTC) and National Research and Development Institute for Food Bioresources – IBA Bucharest (IBA) have a long tradition in cooperating in research projects, starting with 2004.

The cooperation covered projects targeting knowledge and skills transfer activities, demonstrative workshops, seminars, on both national and international level.

Over 10 collaborating projects implemented and other more than 30 application issued, demonstrated the need to upscale out informal mutual peer support to a systemic and permanent collaborative surveille.

So CTC and IBA set a serial seminars/ workshops program, on regular basis (mostly monthly or when necessary).

The program brings together experts in projects writing and implementation from CTC and IBA, as well as invited key speakers from both countries and entities interested in accessing international funds.

Programs considered: **Horizon Europe**, Competitiveness of enterprises and SMEs (COSME), COST, EUREKA, SEE, Consumer protection, Erasmus+, Environment and climate action (LIFE), ERA NET, European Agricultural Fund for Rural Development (EAFRD), Recovery and Resilience Facility, Youth employment initiative.

Aim: increasing access to funding opportunities, within the frame of Horizon Europe, and other European or International funding calls, for IBA, CTC and interested third parties (R&D entities, SMEs, NGOs), from both Es and Ro.

Objectives:

1. Better knowledge on the new Horizon Europe Program and other European and international programs requirements
2. Identifying synergies between CTC and IBA, and creating an operational, yet informal, pole/center of excellence in accessing international R&D project funds
3. Creating a strong portfolio of entities (R&D entities, SMEs, NGOs) eligible to participate together in suitable international partnerships
4. Creating core of partners from Es/Ro to join international partnerships applying for future calls.

The initiative is a part of the IBA Support project, under Operational Competitiveness Structural Fund Program.

POSTERS

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21. Inhibition of fish cooking wastewater oxidation with acorn extract.
22. Pleurotus ostreatus bio-residues: a source of bioactives with antioxidant and antimicrobial activity.
23. Restoring 'Rocha' pear ripening under 1-MCP evergreen effect: a comparison between normal ripening and after auxin treatment.
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50. Enhancing Social Inclusion of Youth Through Employment in Agrifood Sector. AGRIFOOD.

51. Passeurs de Culture – Strategic Partnership and exchanges of best practices.

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53. Utilization of citrus waste and by-products.

01.

NARROW-LEAFED LUPIN (*LUPINUS ANGUSTIFOLIUS* L.) SEED B AND G-CONGLUTINS ARE MULTIFUNCTIONAL NUTRACEUTICAL PROTEINS WITH USES AS FUNCTIONAL FOODS

Elena Lima-Cabello[1], Karan B. Singh[2], Juan D. Alche[1], José C. Jiménez-López[1,2*]

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ABSTRACT

Lupinus angustifolius or narrow-leafed lupin (NLL) is a legume, a strategic Pulse world-wide and an exceptional alternative source of high quality proteins. NLL β and γ−conglutins (vicilin and 7S basic globulin, respectively) seeds proteins exhibit multiple nutraceutical properties recently discovered. NLL β and γ−conglutins benefits go beyond nutritional properties since they display nutraceutical benefits making them sources of innovative ingredients for functional food. They have antioxidant activity and anti-inflammatory properties, capable to improve diseases such as type 2 diabetes through (i) regulation of insulin signalling pathway, (ii) improving insulin sensitivity, (iii) facilitating glucose uptake by cells, (iv) together with their capacity for balancing the oxidative homeostasis, metabolic, and signalling pathways (v) while reducing reactive oxygen species production and increase cellular oxidative defence capacity. These studies are the first describing the anti-inflammatory effects at molecular level of these NLL conglutin protein families, constituting strong evidences that they play crucial roles in the development of novel functional foods for the prevention and treatment of inflammatory-related diseases as obesity, diabetes, cardiovascular diseases and cancer among others.

Acknowledge & Funding

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02.
FOOD WASTE LEVEL IN ROMANIAN HOUSEHOLDS

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ABSTRACT

The objectives of the research were to reveal the determinants of food waste at the level of the domestic consumption, in 2020. The group of urban consumers, adults, maintaining the presumption, according to which rural consumption is predominantly subsistence, with a large circularity of food resources (surplus human consumption is redirected to animal feed, compost, etc.).

The data collection for final consumers was carried out between 11 and 12 May 2020. A total of 991 questionnaires were applied to the urban population residing in Romania during the research. The final sample is representative for the urban population in Romania aged 18 and over.

Data collection was performed through telephone interviews (CATI method - Computer Assisted Telephone Interviewing) by IRES call center operators. The RDD (random digit dialing) method was used to generate telephone numbers, and the respondents were contacted and the questionnaire was administered through the IRES call center software system.

The application of the questionnaires and the observance of the quality criteria were verified by the team of supervisors dedicated to the project, by listening to the conversations in real time and by following the individual activity reports, at the level of each call center operator involved in the project. The average duration of the questionnaires is 12.3 minutes. 21589 calls were generated for the application of the 991 questionnaires.

The present study is a follow-up surveille of Romanian consumers behavior on food waste generation. It is meant to support national efforts in reducing the food waste impact on the food chain, from farm to fork.

03.

POSTHARVEST GEOMETRIC CHARACTERIZATION OF TABLE OLIVES BRUISE FROM 3D DIGITALIZATION. AGRODEMVR.

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ABSTRACT

Physical properties of table olive fruit are important factor in the design of harvesting, transport, classification or commercialization. The visual quality of the fruits harvested is the most important factor limiting the commercialization of the table olives. The mechanical damage during harvesting consists of local tissue degradation resulting in bruising of the fruits. In order to study how to reduce the damage suffered by table olive fruits, the Agro-DemVR cooperative project arises from Spanish Ministry of Industry, Trade, and Tourism. In recent years, several studies have been carried out to identify physical properties and to calculate indices that characterize the damage of olives. They have researched various methodologies, such as standard methods AOAC, digital image analysis, NIR and vis-NIR spectroscopy, etc. However, all of them are based on 2D techniques. The aim of the work is the determination of new geometric parameters based on a 3D analysis of the scanned olives. 3D geometric parameters have been collated with traditionally measured parameters. Throughout the development of the project, it is intended to determine new bruise 3D indices from the 3D information obtained, and compared with the usual indices from 2D characterization, in order to estimate its application in the study of damages in table olives. The information obtained with the new bruise index can be used by the producers to determine how to reduce and prevent bruising during harvesting and processing.

Keywords: 3D scanning; table olives; fruit damage; dimensional properties; 3D bruise index; modelling

AGRO–DEM–VR
MUNDOS VIRTUALES INMERSIVOS APLICADOS AL DISEÑO DE MAQUINARIA AGRÍCOLA QUE EVITE EL MOLESTADO DE LA ACEITUNA DE MESA

COORDINA PARTICIPA FINANCIA

INOLEO cetemet Centro Tecnológico Nacional de la Conserva y Alimentación JAR AEI CLUSTER

04.
FERMENTED FOODS & SUPPLEMENTS

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ABSTRACT

Fermentation is the process in which a substance is divided in simpler components until they reach their basic form. The process can stimulate vitamin and mineral absorption, can generate vitamins from B complex (including B_{12}), vitamin K, enzymes, pre/pro/para/post biotics).

Prebiotics are complex sugars that help the digestive system by helping good bacteria to create a healthier environment. Prebiotics are found in natural form in cereals, honey, garlic, onion, bananas, celery, artichoke.

Probiotics are bacteria that help digesting food. They're found in natural forms in Kefir, yogurt, soft drinks, pickles. Are one of the factors that can keep a healthy digestive system and as a result improve the overall health and longevity.

Fermented drinks are the most popular liquids that contain probiotics. For example, beer and wine (with alcohol), cider, hydromel, kombucha tea (without alcohol) contain yeasts which help the metabolization of the sugars from fruits to produce alcohol in its natural form. Fermented drinks should be introduced in our daily diet and this change will bring a wide variety of benefits that include, but are not limited to: strengthening the immune system, helping with weight loss, lowering fatigue, maintaining bone, muscle, joint health (due to high vitamins, minerals, enzymes and probiotic contents).

Our range 3xBiotic contain: herbs, bee products, milk, medicinal mushrooms, fermented in SCOBY cultures which maintain the vitality and provide a well-balanced organism.

We'll exemplify Col-Kefir® *(*bovine colostrum fermented with enhanced kefir granules, conditioned in powder form by atomization, formulated by Laboratorios Medica as a tri-biotic product) and Amrita® (multi-flower pollen fermented in symbiotic bacteria and yeasts cultures which can be found in all the Kombucell 3xBiotics products that are made by Pro-Natura).

The aerobic and anaerobic fermentation in SCOBY cultures break down colostrums, pollen particles, making a wide variety of proteins, oligopeptides and all essential amino acids, over

one hundred enzymes, flavonoids, polyphenols, phytosterols, auxins and nucleic acids, SCFA, organic silicium, vitamins, minerals. Due this fermentation, the products contains a variety of nutrients with veterinary and human therapeutical effects, while at the same time being a great pre/pro/post biotic complex for dermatocosmetics, food supplements.

Keywords: natural fermentation, Col-Kefir®, Amrita®

05.

HEALTH BENEFITS OF USES AND APPLICATIONS OF *MORINGA OLEIFERA* IN BAKERY PRODUCTS

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ABSTRACT

Moringa oleifera belongs to the Moringaceae family and is the best known of the native *Moringa oleifera* genus. For centuries, it has been used as a system of Ayurvedic and Unani medicine and has a wide range of nutritional and bioactive compounds, including proteins, essential amino acids, carbohydrates, lipids, fibre, vitamins, minerals, phenolic compounds, phytosterols and others. These characteristics allow it to have pharmacological properties, including anti-diabetic, anti-inflammatory, anticarcinogenic, antioxidant, cardioprotective, antimicrobial and hepatoprotective properties. The entire *Moringa oleifera* plant is edible, including its flowers, however, it is not entirely safe, because of compounds that have been found mainly in the root and bark, so the leaf was identified as the safest. *Moringa oleifera* is recognised as an excellent source of phytochemicals, with potential applications in functional and medicinal food preparations due to its nutritional and medicinal properties; many authors have experimented with incorporating it mainly in biscuits, cakes, brownies, meats, juices and sandwiches. The results are fascinating, as the products increase their nutritional value; however, the concentrations cannot be high, as this affects the organoleptic characteristics of the supplemented products. The aim of this study is to review the application of *Moringa oleifera* in bakery products, which will allow the creation of new products that improve their nutritional and functional value

06.

INFLUENCE OF RASPBERRY AND ITS DIETARY FRACTIONS ON THE IN VITRO ACTIVITY OF THE COLONIC MICROBIOTA FROM NORMAL AND OVERWEIGHT SUBJECTS

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ABSTRACT

Raspberry is a source of fibre and phenolic compounds, which are metabolised by the gut microbiota, resulting in the production of SCFAs and phenolic catabolites. However, its effect could be determined by the microbiota composition, since some diseases, like obesity, can cause dysbiosis, which alter catabolite production. The aim of this study was to investigate whether the whole raspberry and its fractions (phenolic extract, total and insoluble dietary fibre) affect the microbial activity influenced by the faecal inoculum (normal-weight and overweight). For this, *in vitro* fermentations of raspberry fractions were carried out using faeces from both groups, phenolic catabolites and SCFAs were analysed by liquid chromatography (HPLC-DAD) and gas chromatography (GC-FID), respectively. The whole raspberry and the phenolic extract produced greater quantities of urolithins and total SCFAs when compared with fibre fractions. The body weight condition was an important factor, since faeces from normal-weight subjects gave rise to greater production of urolithins from fibre fractions. On the contrary, for faeces from overweight subjects the urolithins production was higher from the fractions with more extractable polyphenols. In summary, the whole raspberry has been shown to have a prebiotic effect, mainly due to its phenolic compounds content rather than its fibre content.

Keywords: Dietary fibre, phenolic compounds, urolithin, SCFAs, HPLC-DAD.

07.

ACTIONS TO SUPPORT R&D IN THE AGRI-FOOD SECTOR OF THE REGION OF MURCIA. STRATEGIC PRIORITIES IN CIRCULAR ECONOMY. VITECIR

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ABSTRACT

Circular Economy represents a drastic change in current production and consumption systems, maintaining the value of natural resources and products, limiting the consumption of raw materials and energy, avoiding the creation of waste, and mitigating negative impacts on the environment., climate and health

The agri-food industry is one of the sectors most exposed to the challenges and opportunities of sustainability, due to its direct dependence and action on natural resources, which is why it is considered a high-impact industry. Sustainability, in all its aspects: social, economic and environmental, is a fundamental parameter for companies.

In the Spanish Circular Economy Strategy with a perspective until 2030, the importance of incorporating the circular economy as a key element in the transformation towards a more innovative, competitive and sustainable development and growth model is reflected, which allows maximizing available resources and reduce waste generation.

In 2019, CTNC, following a methodology from the University of Ghent, carried out a SWOT and SOR analysis on the state of the Circular Economy in the agri-food sector and in research organizations, within the project with acronym VT-ECOCIMUR. This methodology was already used by the CTNC in the AGFORISE FP7 Project.

In 2020, within the VITECIR project and based on the results of the 2019 project, the strategic priorities of the sector in circular economy have been defined by carrying out two analyses:

- Agri-food industry
- Research organizations (always in relation to the agri-food sector)

CTNC together with experts carried out an in-depth study of the conclusions of the Strategic Objectives of the 2019 project, as well as the measures that should be taken to face the challenges detected to define regional priorities in the agri-food sector on Circular Economy at the company and researchers' levels.

Two surveys were designed, one for companies and the other for researchers whose results were analysed.

VITECIR project has been funded by the Region of Murcia Development Agency INFO with reference number 2020.08.CT02.0001

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08.

REMOVAL OF TOXIC COMPOUNDS FROM NATURAL EXTRACTS USING GREEN TECHNIQUES. ET1CLEANEXTRACT

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ABSTRACT

The extraction of healthy compounds from fruit and vegetable waste makes these compounds organic, non-toxic and biocompatible together with the simultaneous utilisation of the waste, thus reducing the risks of waste accumulation in the environment. Therefore, the treatment of fruit waste through different techniques such as landfilling or incineration can be avoided to prevent the negative effect on the environment as well as the cost and labour investment in the process.

Post-harvest treatments based on pesticides, which are applied to fruit and vegetables to increase their shelf life, are present in the by-products generated after industrial processing. These by-products, which are currently used for extracting compounds of interest such as proteins, vitamins, pigments and phenolic compounds, lead to the carry-over of these pesticides and other toxic substances, such as heavy metals and mycotoxins, in the extracts, making unfeasible their use as ingredients in the food industry.

The CTC has generated in-depth knowledge, through the development of different projects, both in the extraction of compounds of interest from food by-products and in the development of low-cost natural adsorbents for the elimination of pollutants in water. This project aims to develop technologies for the elimination of toxic compounds from natural extracts using low-cost adsorbents, without reducing the concentration of the compounds of interest because of the adsorption process.

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09.

NOVEL CLEAN EXTRACTION PROCESSES FOR THE RECOVERY OF POLYPHENOLS FROM FOOD BY-PRODUCTS. ET2GREENPHENOLIC

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ABSTRACT.

Food by-products and wastes are potential sources of bioactive compounds, including organic compounds such as phenolic compounds, which are of great interest to the food, cosmetic and pharmaceutical industries. There is a growing interest in the development of initiatives for the treatment of food by-products and the recovery of compounds of interest from them, due to the double advantage that they present; reducing the volume of waste and minimising the costs involved in waste management.

The main objective of this project is to recover a product or obtain a new one, that can be marketed with the consequent benefit from an economic and enviromental point of view.

The ET2GREENPHENOLIC project is innovative due to the extraction of phenolic compounds with novel techniques, providing the possibility of using agri-food waste and obtaining substances with high added value.

Different low-cost extraction methods will be developed to obtain phenolic compounds of interest from wastes of food industry, using innovative technologies. The novel methods will present high yields and provide green phenolic compounds for mainly used in the food, cosmetics and pharmaceutical sectors.

10.

ORIGIN AND IDENTIFICATION OF VALUABLE COMPONENTS IN THE EXTRA VIRGIN OLIVE OIL PROTEOME

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ABSTRACT

Early analyses have detected proteins as minor components of extra virgin olive oil (EVOO); however, precise identification of the olive oil proteome has not been yet accomplished. In the present contribution, we have uncovered the EVOO proteome for the first time by using a batch protein isolation method, followed by protein concentration, SDS-PAGE profiling and nLC-MS analysis of gel slices of interest [1]. The most abundant proteins in EVOO consisted of seed storage proteins of globulin-type, an active 13-lipoxygenase and several potential allergenic proteins, including profilin (a widely-present panallergen). Experimental validation of the proteomic data was performed by Western blotting and enzyme activity assays. Our data demonstrated that the seed is the main source of proteins in EVOO, while the contribution of the pulp is uncertain and needs further verification. Moreover, up to 15 fungal proteins from the from the yeast-like fungus *Aureobasidium pullulans* were also detected [2]. Their presence seems to be circumstantial and suggests that harvested olive fruits might become contaminated either in the field or during their storage. Investigations to assess the potential impact of EVOO proteins on parameters like its oxidative stability and quality are currently underway. Also, their relevance to human health is under evaluation.

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11.

STATUS OF THE EFFECTIVE VALORISATION OF SECONDARY RAW MATERIALS OF THE AGRI-FOOD INDUSTRY IN THE REGION OF MURCIA AND FOOD TECHNOLOGY SURVEILLANCE 2021. VALORMUR.

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In November 2019, the president of the European Commission presented the EU Green Deal, a plan that includes fifty concrete actions to combat climate change, which aims to make Europe the first climate-neutral continent by 2050. The objective of this 'EU Green Deal' is for Europe to have a clean economy, with zero emissions, and to protect our natural habitat to improve the well-being of people and companies and to take the lead in climate action across the planet.

CTNC has been working since 2007 on valorization of agrifood secondary raw materials or co-products in both national and international projects: Rewaste Life, STEP Interreg IIIB MEDOCC, Biomemploi Leonardo, Natal (national project), AGROWASTE Life, etc. CTNC is currently developing the following projects related to the recovery of secondary raw materials (including water): Life+ Cleanup, Horizon 2020 BBI Algaeceuticals, Supra-regional Operational Group INNOEXTRACT, Regional Operational Group Water Footprint, Interreg Europe iWatermap. This experience in sustainability issues makes CTNC the appropriate agent to promote sustainability strategies to support the regional agri-food industry.

The general objective of this action is to involve the food sector of the Region of Murcia which includes all the agents involved, in the important challenge of transition towards a circular economy, moving from a linear production model to a more efficient and sustainable circular one.

The following activities will be carried out:

- Identify the geographical locations of generation of secondary raw materials
- Roughly quantify the volume and timing of the production of secondary raw materials
- Study the needs for valorisation by regional agrofood companies
- Study technological offers of the different research and innovation actors in the Region of Murcia
- Identification of success stories
- Technological surveillance in food legislation.

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12.

APPLICATION OF CHEMICAL ELECTROLYSIS IN WATER FOR THE REMOVAL OF ORGANIC POLLUTANTS. AQUAROX.

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ABSTRACT

The new REGULATION (EU) 2020/741 of the European Parliament and of the Council concerning minimum requirements for the reuse of reclaimed water considers other parameters not included in the previous Spanish RD (RD 1620/2007), making the specific quality requirements, especially from a microbiological and sanitary point of view, more restrictive.

The agri-food sector is one of the most important sectors in the Region of Murcia. Since water supply is essential for agricultural production, especially in arid areas such as the Region of Murcia, adequate management of water resources is required to guarantee the world's food supply. Thus, in a scenario where water stress and climate change are becoming more and more pronounced, water reuse is a reliable alternative to conventional water resources.

The Region of Murcia is a European leader and, together with Israel, a world leader in the treatment and reuse of reclaimed water, reusing up to 97% of the region's total treated water.

It is therefore logical to think that the implementation of the new regulation will directly affect the region's WWTPs, and therefore the entire agri-food sector. Fundamentally because the disinfection systems commonly used, generally chlorination and to a lesser extent ultraviolet, are not effective in eliminating Clostridium perfringens spores, which are highly resistant to biological, physical and chemical treatments. Secondly, because current treatment technologies do not allow the complete elimination of emerging pollutants, so that, even in low concentrations, they are continuously discharged into the environment through treated water. And, finally, because most of the current disinfection technologies, such as chlorination, involve the addition or generation of toxic disinfection products to the water, such as chlorates, trihalomethanes or haloacetic acids.

Thus, in this project we propose to study the effectiveness of alternative technologies such as chemical electrolysis, with high oxidation power of organic matter and compounds, for the disinfection and elimination of emerging pollutants from wastewater, thus complying with the requirements established in the new EU Regulation.

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13.

OBTAINING PROTEIN HYDROLYSATES FROM VEGETABLE BY-PRODUCTS USING HD ULTRASOUND-ASSISTED PROTOCOLS. RECUPERA.

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ABSTRACT

One of the most common characteristics of all activities related to the transformation and processing of fruits and vegetables is the large amount of vegetal waste it generates. Between 15 and 60% of the processed raw material becomes vegetable waste and currently, and in general, it is not used from a commercial point of view. There are many possibilities for the recovery of this type of waste, but the use of its constituents of interest is undoubtedly one of the most attractive. The main "active ingredients" contained in a vegetal material: compounds of interest, nutritional components or bioactive principles, etc., can be extracted and used by the food industry itself for the production of new products or as ingredients of others, thus obtaining products enriched with high added value.

On the other hand, different studies establish the need to look for new protein sources that can meet the growing demand of an expanding world population and the new eating habits of EU countries. These, together with the high environmental and economic costs of existing protein sources, are some of the main reasons for the increased interest in the search for new protein sources for the food and beverage market. In this line, the global protein market is growing with a clear focus on plant-based proteins mainly due to lower costs compared to animal-based proteins, consumers seeking more plant-centred diets and the lack of acceptance of other protein sources: insects, algae, etc.

Several studies show that protein extraction by ultrasound-assisted processes significantly increases the extraction yields. It also improves some properties of the proteins obtained such as foaming and emulsifying capacities and their solubility. Some health functionalities are also improved. These studies conclude that ultrasound-assisted extraction has a great potential for application in the vegetable protein industry.

In summary, environmental concerns, the use of resources in circular economy systems and the growing demand for new sources of vegetable proteins have led to a growing interest in the possibilities of using agri-food waste and its potential as a source of protein in high added value products. Therefore, this project optimises sustainable extraction and purification protocols

assisted by high-intensity ultrasound to obtain extracts rich in vegetable proteins and their transformation into protein hydrolysates in order to provide them with better properties for use in the food industry.

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14.

DNA-BASED IDENTIFICATION AND AUTHENTICATION OF AGRI-FOOD PRODUCTS FROM N. AEGEAN ISLANDS AND CYPRUS

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ABSTRACT

Local products contribute to the 'identity' of a region by developing strong links between the products and the cultural characteristics of the regions of origin, thus promoting the traditional 'agri-food' heritage. This is particularly important both for the already certified and non-certified products, especially for areas with specific unique characteristics like the the cross-border areas of North Aegean and Cyprus contributing to the growth of the agri-food sector. In recent years there has been a shift of consumers towards local- traditional products with unique and distinctive quality characteristics. Therefore, the identification and traceability of raw materials used in plant- and animal- based agri-foods is of paramount importance for highlighting the commercial value, preventing fraudulent practices and unfair competition, as well as safeguarding consumers' and producers' rights. In this framework, DNA-based identification of the plant- and animal-derived products from the North Aegean and Cyprus was performed using a combination of molecular markers, DNA barcoding and High-Resolution Melting Curve (HRM) analyses. For the plant samples, amplification of the *trnL* (chloroplast) and *ITS2* (nuclear) regions was performed by DNA barcoding analysis followed by sequencing. The expected relationship between the different species from the different 46 local samples tested was observed, and intra-specific polymorphisms were identified. The lower identification limits for the different plant species were estimated based on the BLAST alignment. Additionally, animal-based products were authenticated with HRM analysis coupled with species-specific primers for three major animal species, i.e. cattle, goat and sheep, used in dairy and meat products. A total of 71 samples from Cyprus (34 cheese and 20 cold cuts) and North Aegean (12 cheese and 5 cold cuts) were analysed. In several samples, such as haloumi cheese, the genetic identity confirmed the composition indicated on the packaging. However, there were samples with genetic identity that deviated from the information on the label. HRM profiles and the percentage confidence values (CV%) were used to estimate the lower threshold for the determination of authenticity. The derived sequences from plant and animal species and the analysed genetic identification

data have been organized and stored in a database created for the project using the MySQL database management tools. The results of the genetic analyses have been used for the development of a certification process. The local and traditional products awarded with the certification signature will strengthen the competitiveness of agri-food enterprises and rural entrepreneurship by facilitating the commercial exploitation of these products in domestic and international markets.

15.

AROMA CHARACTERIZATION OF VIRGIN OLIVE OIL FROM FIVE TURKISH OLIVE VARIETIES BY SPME/GC/QTOF MS

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ABSTRACT

Extra-virgin olive has a unique flavor that distinguishes it from other vegetable oils. Sensory quality is affected by different volatile and phenolic compounds of olives. The formation of these components varies depending on many factors such as the climatization, variety, sea level where olives are grown, growing techniques, harvesting time, processing techniques and storage conditions.

In this study, the changes in the volatile compounds of olive oil were investigated in terms of variety and geographical regions. The volatile compounds of olive oils were extracted by solid phase micro extraction (SPME) method and identified by gas chromatography-time-of-flight mass spectrometer (GC QTOF-MS). Olive samples were taken from 4 different regions (Mediterranean, Aegean, Southeastern Anatolia, Marmara) in 2019-2020. A total of 100 olive oil samples were obtained under the same conditions by cold pressing during two harvest years.

5 ml of olive oil sample was placed in a 40 mL SPME vial sealed with a polytetrafluoroethylene-faced silicone septum. The vial was left at 45°C in a thermoblock during 60 min with magnetic stirring . The DVB/CAR/PDMS fiber (50/30 µm, Supelco) which was absorbed by the volatile compounds was thermally desorbed into the injection port of the gas chromatography for 10 min at 250°C. Identification of volatile compounds were carried out using databases developed by NIST and WILEY .

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16.

COULD WE USE ANTIOXIDANTS TO PRODUCE FOODS WITH LOW ACRYLAMIDE CONTENT?

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In 2002, it was found that heat-treated foods contain a considerable amount of neurotoxic and carcinogenic compound called acrylamide. After then, many studies have been performed in order to decrease acrylamide formation. Among different parameters, the impact of antioxidants on acrylamide has not been yet clarified adequately. In some studies, arylamide level decreased, increased or did not change. It can be related to the ability of antioxidants with different structures to react with acrylamide precursors. Also, the same kind of antioxidant may behave differently in various studies owing to distinct reaction conditions, concentrations of the extract and preparation methods of the extract. Hence, results of different studies should be examined in detail in order to understand the effect of antioxidants on acrylamide. In this study, information about the role of antioxidants on acrylamide formation and the results of related past studies will be given.

17.
EFFECT OF THERMAL PROCESSING ON FOOD ALLERGENS

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ABSTRACT

Food processing has the potential to alter the allergenicity of foods. There are several processing methods that influence the allergenic properties of foods; thermal processing, fermentation, hydrolysis, ultrasonication, irradiation, high pressure processing, etc. Depending on the processing method, processing conditions and the food structure, partial or complete removal of the offending allergen may be possible.

Thermal treatments are perhaps the most widely used group of food processing methods applied to food to keep or improve microbiological quality or to process the food. Thermal processing such as roasting, curing, and various types of cooking can cause multiple, nonenzymatic, biochemical reactions to occur in foods. Heat treatment of food proteins may produce different modifications including unfolding, aggregation, chemical modification, or cross-linking to matrix components such as lipids and carbohydrates. Heat-induced denaturation of proteins or reaction of food proteins with the food matrix could alter allergenic potency of the food product.

Thermal treatment is commonly applied to many allergenic ingredients, in particular to milk, egg, tree nuts, soybean, wheat. The degree of structural changes of proteins occurring during heating depends on both the type of protein and the thermal load. While pasteurisation increases allergenicity of milk as measured by IgE binding studies, possibly due to aggregation, the decrease in IgE binding capacity caused by sterilisation can be explained by denaturation and Maillard reaction of existing epitopes of both β-lactoglobulin and α-lactalbumin. On the other hand thermal processing may reduce allergenicity of PR-10 proteins in hazelnut and almond, in contrast to nsLTPs and seed storage proteins. As a consequence, thermal processing will have several effects on the proteins allergenicity by either reducing or enhancing depending on the processing method, the applied conditions and protein structure.

18.

IMPORTANCE OF GOOD AGRICULTURAL PRACTICES AND PRECISION FARMING

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ABSTRACT

Today, agriculture is very important for all countries in the world. On the same land area, farmers have to produce more agricultural products to feed people in spite of limited resources. Also, they should take into consideration food safety problems and protect public health. Good agricultural practices (GAPs) and precision farming (agriculture) terms came in sight in this context. Simply, good agricultural practices (GAPs) can be defined as a sum of rules that are applied during production for obtaining safe and healthy foods by considering social, economic and environmental sustainability. Many definitions exist for precision farming. In most wider definition, the precision farming is regarded as an information technology applied to agriculture. Precision farming shares similar rules with GAPs such as correct information, correct analysis, correct dose, correct chemical, correct equipment and correct place. By means of these approaches, the yield will increase, the cost will decrease and the negative effects on the environment diminishes. In this study, the definitions and importance of GAPs and precision farming will mentioned.

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19.

R&D SOLUTIONS TO DEMONSTRATE AND VALIDATE THE EFFICACY AND FUNCTIONALITY OF NEW FUNCTIONAL FOOD AND NUTRACEUTICAL PRODUCTS

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ABSTRACT

Nutritional complements and novel foods hold the promise of a healthy life style. These food complements help our cells to remove harmful metabolites (free radicals, lactic acid, etc), increase energy and immunoprotection, and reduce bioactive molecules to healthy levels (such as cholesterol, glucose, triglycerides, etc.), the replacement of electrolytes after sports practice and the restoration of an imbalance in the microbiome. Legal regulation prevents commercial misinformation to help customers make the right choice and ensure protection of the investment of manufacturers on R+D. Thus, one of the current trends in the food biotechnology field is the development of new differentiated and specific functional products, which can alleviate certain deficiencies and / or physiological disorders, as well as ensuring healthy aging.

The aim of Bionos Biotech is to help producers and manufacturers to develop the best assays to test the efficacy and functionality of the food-nutraceutical ingredients in order to support market claims. We analyse the potential beneficial effects of a product through in vitro and clinical studies that assess the influence of the product on different biological markers, including biochemical blood parameters (hemogram, glucose, cholesterol, urine, creatine), physical markers (blood pressure), or microbiological profiles (Microbiome NGS Sequencing). In parallel, we also develop in vitro bioassays to measure the functional effects of a product in human cell lines or animal models such as gene expression, or biomarkers' quantification involved in fatty acid, glucose, and hormone metabolism (ACO1, PPARa GADPH, GLUT-1), as well as enzymatic activity (Amylase, PLA2, etc).

20.

EFFECTS OF FREEZING, DRYING AND STORAGE ON BIOLOGICAL PROPERTIES OF TOMATO AND CARROT BY-PRODUCTS

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ABSTRACT

Vegetables and fruits have an interesting nutritional profile, rich in bioactive metabolites such as carotenoids, flavonoids, phenolic acids and alkaloids, holding a high antioxidant potential and health-associated benefits in chronic, cardiovascular, neurological and some cancer diseases1,2. Tomato and carrot are some of the most consumed fresh and cooked vegetables worldwide. Numerous studies have reported high levels of bioactive compounds in tomato and carrot and consequent antioxidant activity, for instance, lycopene, phenolics, flavonoids and vitamin E; and anthocyanins, phenolics and carotenoids, respectively1. Besides their biological and functional properties, the shorter shelf life due to their high-water content (>80%) coupled to their seasonality nature, leads to extensive food losses and waste2. Accordingly, the valorisation of fruit and vegetables by-products to develop value-added products and the application of preservation methods is of utmost importance to combat food losses and waste. In this study, the impact of freezing, drying and storage time on some biological properties of tomato and carrot by-products, which do not comply with size and shape commercial standards were investigated. Total phenolic compounds (TPC) and antioxidant activities as well as the carotenoid and polyphenolic profile of tomato and carrot by-products were studied.

On one hand, the tomato and carrot by-products were processed in pulps, frozen for 6 months and analysed monthly. On the other hand, vegetables were dried by hot air and vacuum-stored, for 6 months, and analysed every two months. The results suggested that TPC and polyphenolic concentration decrease during the freezing period in both vegetables. In contrast, the results indicated that freezing of tomato and carrot pulps improves the carotenoid profile during the first months of storage, but after this period, its concentration decreases. The drying process negatively impacts the TPC, as well as, polyphenolic and carotenoid profile comparatively to the fresh vegetables. However, the results also suggested that there is no significant variations during storage time. Some hydroxycinnamic acids such as, chlorogenic, p-coumaric, isoferulic, transferulic acids and some derivatives belonging to this group were identified and quantified

in carrots. Besides, chlorogenic acid, p-coumaric, sinapic acid and other hydroxycinnamic acid derivatives were also monitored in tomato, among flavonols such as, rutin and some flavanols derivatives. The most prevalent carotenoid in tomato was lycopene, ranging between 1250.3 and 2393.1 mg 100 g-1 DM in frozen pulps and 161.5 and 187.2 mg 100 g-1 DM in dry samples. Also, lutein, alpha- and beta-carotene were identified and quantified in frozen pulps and dry tomato. Regarding carrot, the concentration of lutein, alpha- and beta-carotene were also evaluated, being the last one the most incident carotenoid, with concentrations between 162.4 and 319.5 mg 100 g-1 DM in frozen pulps and 32.8 and 34.0 mg 100 g-1 DM in dry carrot.

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21.
INHIBITION OF FISH COOKING WASTEWATER OXIDATION WITH ACORN EXTRACT

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ABSTRACT

The intake of fish oil dietary supplements has been increased due to their rich polyunsaturated fatty acids (PUFA) nutritional composition. PUFA mainly, eicosapentaenoic (EPA), docosahexaenoic acids (DHA) and docosapentaenoic acid (DPA), have been associated to several health benefits related to brain, cardiovascular and kidney functions as well as inflammatory and immunological responses1. However, their multiple bonds' chemical nature makes them highly unstable and easily oxidizable. PUFA oxidation contributes to off-flavors in foods1,2 and their products (e.g. hydroperoxides and aldehydes) have also been associated with harmful health effects. Accordingly, value-added strategies to stabilize PUFA present in fish oils such as, the application of antioxidant extracts, have gained popularity2. In this study, the stabilization potential of a natural antioxidant extract on a rich source of PUFA was evaluated. Wastewater resultant from sardine (*Sardina pilchardus*) cooking was treated with acorn extract, which possesses a high antioxidant potential, and was centrifuged using a Westfalia type ADB centrifuge to separate the fat fraction. The fat fraction of control sample, without antioxidant treatment, was also separated. Total fat content and oxidation index were evaluated for the control (non-treated) and acorn extract-treated sample, using the soxhlet method and peroxide index based on International Standard Operation 3960:2007, respectively. Both samples have a similar total fat content, approximately 83% however, the results indicated a decrease in the oxidation index from 98.75 to 97.50 meq O kg-1 of fat in the sample with acorn extract. In order to identify and quantify the fatty acids present in both samples and understand the impact of antioxidant extract, their fatty acids profile was monitored through GC analysis. The fatty acids profile analysis suggested some variations in the saturated and unsaturated fatty acids concentrations of control and acorn extract-treated samples. These variations were more evident in long-chain unsaturated fatty acids, namely C18:1 c9 (oleic acid), C18:2 c9c12 (linoleic acid - LA), C18:1 c11, C18:3 c9c12c15 (α-linoleic acid - ALA), C18:2 c0t11, c20:1 c9, C20:4 c5c8c11c14 (arachidonic acid - ARA), C20:5 c5c8c11c14c17 (EPA), C22:5 (DPA) and C22:6 (DHA), which were more preserved in acorn extract-treated sample. As an example, the results suggested that in the antioxidant-treated sample the EPA had a concentration of 115.7 µg mL-1, DPA of 10.9 µg mL-1 and DHA of 28.4 µg mL-1, in contrast to

0.25, 0.0 and 0.0 µg mL-1 in the control sample, respectively. Consequently, these preliminary results indicated that acorn extract might prevent the oxidation of PUFA in this fish oil.

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22.

PLEUROTUS OSTREATUS BIO-RESIDUES: A SOURCE OF BIOACTIVES WITH ANTIOXIDANT AND ANTIMICROBIAL ACTIVITY

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ABSTRACT

Mushrooms are known to be a rich source of functional and bioactive compounds. Among these, phenolic compounds and polysaccharides, mainly β-glucans, stand out due to their antioxidant and immunomodulatory effects, respectively[1]. In the present work, the total phenolic compounds content, the content in β-glucans and bioactivity properties from the bio-residues obtained from mushroom production were evaluated in order to develop a circular bioeconomy approach. *Pleurotus ostreatus*, one of the most cultivated species worldwide[1], was studied. The extraction was performed using water as the only solvent to obtain the possible greener process and easy to scale up at the industrial level.

The aqueous extracts were obtained according to two different methods (1 and 2). In method 1, a hot extraction was performed (90 °C; 1 h; 500 rpm; extract 1A). In method 2, a room temperature extraction was carried out (extract 2A), and the resulting residue was subsequently extracted with hot water (90 °C; 1 h; 500 rpm; extract 2B). Extracts were freeze-dried, and the content of total phenolic compounds (TPC) was determined using the Folin-Ciocalteu method. β-glucans content was determined according to the "β-Glucan Assay Kit (Yeast & Mushroom)" assay. Moreover, the extracts' bioactivity was evaluated by assessing the antioxidant (ABTS, DPPH and ORAC) and antimicrobial (minimum inhibitory concentration – MIC) activities. The mutagenicity and cytotoxicity were evaluated by Ames and PrestoBlue assays, respectively.

The TPC obtained was 11.94 ± 1.50, 9.95 ± 0.50 and 12.39± 0.57 mg gallic acid equivalent per g of dry extract for extracts 1A, 2A and 2B, respectively. Regarding the β-glucan content the results were: 10.67 ± 0.19 (1A), 7.62 ± 0.09 (2A), 5.96 ± 0.03 (2B) g per 100 g of dry mushroom. The extracts M2B and M1 were the ones that presented the highest results for the phenolic compounds and β-glucans, respectively. Furthermore, all extracts showed antioxidant activity (lower activity in the DPPH assay) and antimicrobial activity against the tested bacteria (*Salmonella enterica*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Pseudomonas fluorescens*, *Pseudomonas tolaasii*, *Pseudomonas agarici*, *Yersinia enterocolitica*, *Staphylococcus aureus*, *Bacillus cereus* e *Listeria*

monocytogenes), with the 2A extract standing out as an inhibitor of bacterial growth. The extracts did not show mutagenicity or cytotoxicity at the tested concentrations (40 mg/mL). Thus, the aqueous extracts from *P. ostreatus* bio-residues could be considered a promissory natural source of bioactives, namely phenolic compounds and β-glucans with relevant biological properties. Besides, the valorisation of these bio-residues presents an opportunity to promote the mushroom production chain sustainability.

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23.

RESTORING 'ROCHA' PEAR RIPENING UNDER 1-MCP EVERGREEN EFFECT: A COMPARISON BETWEEN NORMAL RIPENING AND AFTER AUXIN TREATMENT

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ABSTRACT

'Rocha' pear (*Pyrus communis* L. cv. Rocha) is a DOP cultivar, from West region of Portugal, appreciated worldwide due to its exceptional organoleptic and nutritional quality [1-2]. It´s high exportation has raised the need to develop adequate conditions for long-term cold storage. For about forty years, the postharvest application of diphenylamine was an efficient strategy used to protect fruit from postharvest problems. However, in 2011 its use was prohibited. Nowadays, in combination with cold storage, 1-MCP has been one of the most applied techniques to extend the storage of 'Rocha' pear. However, fruit industry is facing a problem resulting from 1-MCP application which compromise producers' sustainability, because 1-MCP disrupts the normal process of ripening, denominated as "evergreen" effect, affecting the quality of 'Rocha' pear and increasing postharvest losses [3–4].

In this study, we have tested the restoring of ripening via exposure of 1-MCP treated fruits to an auxin. Time course physiological and biochemical analysis comparison with 'Rocha' pear normal ripening, revealed that ripening induction by the auxin treatment, after 1-MCP, is evident from around 60 % of fruit firmness loss and around 50 % increased internal ethylene production. Exogenous auxin treatment increased of 1-aminocyclopropane carboxylic acid (ACC) and malonyl-ACC (MACC) levels, ACC synthase (ACS) and ACC oxidase (ACO) activity and enhanced the pear fruit ripening.

The results provide information regarding how blockage caused by 1-MCP may be circumvented, thus opening avenues for consistent ripening of 'Rocha' pear.

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24.

BIOACTIVE PEPTIDES PRODUCED FROM THE MUSSEL *MYTILUS GALLOPROVINCIALIS* BY ENZYMATIC HYDROLYSIS WITH COROLASE

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ABSTRACT

Bioactive peptides have been produced from several marine sources since they can exhibit positive effects for humans and animals. *Mytilus galloprovincialis* is highly consumed in several countries and has a meat rich in proteins, which has been described as a source of bioactive peptides with relevant properties such as antioxidant, anti-hypertensive and antimicrobial activities. Mussel commercialization generates waste, since the small or broken mussels are discarded. Thus, in this work discarded mussels were used with the goal of producing water soluble extracts rich in proteins and bioactive peptides.

The mussel meat was firstly minced, and then submitted to different conditions of enzymatic hydrolysis, using the protease corolase to generate peptides. The variable factors evaluated were temperature, incubation time and enzyme concentration. To achieve the optimal extraction conditions, a Box-Behnken experimental design was performed using statgraphic centurion software. Factorial design allowed the evaluation of the effects of the three factors on protein release, antioxidant and anti-hypertensive properties of the extracts. The protein content of each extract was determined by Kjeldahl, the antioxidant activity was determined by oxygen-radical absorbance-capacity (ORAC) assay and anti-hypertensive property was determined by the inhibition method of Angiotensin-I converting enzyme (ACE). The incubation of the minced mussel meat with 3% of enzyme, at 40 ºC for 3 hours, appears to be the best conditions to obtain the best results of protein extraction, and antioxidant and anti-hypertensive properties. With these conditions, the obtained extracts showed 48% of protein content, an antioxidant activity of 821 µmol TE / g of extract, and an ability of inhibiting the activity of ACE in 61% (using a concentration of 10 mg / mL).

Thus, the factorial design allowed to confirm the combination of experimental factors that leads to the most efficient extraction of antioxidant and anti-hypertensive peptides of the mussel *Mytilus galloprovincialis*. In conclusion, the use of discarded mussels to produce functional ingredients for food, cosmetic and pharmaceutic industries contribute to valorise world waste in a circular economy context.

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25.

APPLE BY-PRODUCTS TRANSFORMATION INTO FLOURS.

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ABSTRACT

Fruits and vegetable are responsible for about 22% of food losses and wastes along the supply chain from harvest up to, but not including the retail level. Nevertheless, the scientific community have been found that fruit and vegetable by-products may be transformed into flours that are rich in fibre and bioactive compounds, thus bringing value to several food industries, namely bakery, dairy, snacks, and meat products.

The goal of this work was to produce and analyse flours from apple (Gala cultivar) by-products. By-products were individually, dried at 55 °C and ground to powder. The resulting apple flour had a moisture content of 10.8±0.4%. This flour presented a low fat content (1.37±0.03%). Total carbohydrates content was 84.0 ± 0.8%. The sugars present were sucrose, glucose and fructose totalising 526.5±36.2 mg sugars/g of flour. Apple flour presented 20.8±0.3% of insoluble dietary fibre (DF), 9.9±2.5 % of soluble DF and 30.7±2.9 % of total DF. Antioxidant activity was measured using ABTS, DPPH and ORAC methods and all methods showed that antioxidant activity was higher for the apple flour than for the fresh apple by-products. Total phenolic content had the same behaviour as the results of antioxidant activity: higher in apple flour (0.91 mg GAE/g) than in fresh apple by-products (0.23 mg GAE/g). The phenolic compounds detected in apple flour was chlorogenic acid, quercetin-3-glucoside and rutin.

These results showed that apple flour is rich in fibre and bioactive compounds such as phenolic compounds resulting in an antioxidant effect. Thus, transforming apple by-products into flour can be an effective way to valorise these by-products once these flours can used as added-value ingredients, for instance, to increase fibre content in foods.

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26.

NEW FUNCTIONAL FOOD PRODUCTS BASED ON WHEAT AND SOYBEAN PROCESSING BY-PRODUCTS

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Food by-products are not yet fully exploited and deserve all the efforts towards increasing their consumption by humans. Today, more than ever, making suitable use of all food resources can be crucial to meet the demand for food by future generations and contribute significantly to overcome environmental burdens. In the cereal industry, wheat bran and germ (11-15% and 2–4% of the seed weight, respectively) are wheat milling by-products with various nutritional attributes [1]in Europe, most wheat-based food products are made with refined endosperm from which the germ and peripheral layers (bran, which are not yet efficiently used for human consumption, being sold mainly as animal feed at a low price. Besides adding value, more regular consumption of these products can be associated with health benefits, such as a lower risk of type 2 diabetes, cardiovascular disease and weight gain [2]there are no comprehensive and quantitative assessments of available data in humans. The aim of this study was to systematically examine longitudinal studies investigating whole-grain and fiber intake in relation to risk of type 2 diabetes (T2D. Another high-value by-product with a promising future is the okara flour, produced during soybean processing,-that is rich in fibre (50%) and protein (30%) [3]especially in fibers, proteins and lipids. Stabilization processes are required to assure its efficient and safe use, because there are few studies on okara. The main objective of this study was to evaluate the chemical composition (protein, fiber, lipids, ash and isoflavones, representing an interesting protein source, which has the potential to prevent diabetes, obesity and hyperlipidaemia [4]. Within this context, the present work aimed to develop two new high-value functional granules for human consumption based on the valorisation of wheat and soybean by-products (bran, germ and okara), ensuring high contents of protein, fibre and omega-3 fatty acids. The objective was to formulate functional granules (F1 and F2) that could simulate the composition of seed grains currently considered “superfoods” due to their richness in essential nutrients and bioactive compounds, such as quinoa, flaxseed and chia. The granule formulations F1 (bran, germ and okara) and F2 (bran and germ) were established and successfully developed by cold extrusion. These together with the original by-products were characterized regarding their nutritional composition (ash, dry matter, protein, total fibre, insoluble fibre, lipids, carbohydrates, starch, fatty acids), total phenolics and antioxidant activity (ABTS and DPPH). F1 and F2 presented 31.37 and 25.68% of protein and, 16.93 and 25.18% of fibre, respectively. Both formulations met the requirements of rich

in protein (≥20% of the food energy value provided by the protein) and rich in fibre (≥6 g of fibre/100 g), thus fulfilling the requirements for PROTEIN+ and FIBER+ functional granules for human consumption. In conclusion, these by-products can be valorised as potential ingredients for human consumption with added nutritional value and potential functional properties.

Keywords: By-products, wheat bran, wheat germ, okara, functional food, high protein.

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27.

ECO-EFFICIENCY INDICATORS (WATER FOOTPRINT) AS A QUALITY PARAMETER IN THE PRODUCTION AND COMMERCIALIZATION OF AGROFOOD PRODUCTS

GRUPO OPERATIVO PARA LA ECOEFICIENCIA DEL SECTOR AGROALIMENTARIO, Murcia, Spain

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ABSTRACT

This Water Footprint project will make possible to know and compare the efficiency of the use of water in the production and commercialization process of products and agro-industrial activity. To set up a level of environmental quality through the commitment of a responsible and supportive company with sustainability and establish to a new brand that differentiates its products from others that do not have that commitment. In addition, they will allow us to propose a certification of water eco-efficiency of agrifood companies through the establishment of indicators that allow reducing and optimizing the use of water in the production processes of tomato and peach with the consequent economic and natural resources savings, specifically water, a scarce good.

From an environmental point of view, it will mean less dependence on water in the manufacturing process, better use and the application of technologies aimed at the efficient control of water consumption, avoiding unnecessary losses and reusing part of them in different processes, with which water needs will be lower and the impact on transfers or own resources will decrease.

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More information: https://www.huellahidrica.es/

"Fondo Europeo Agrícola de Desarrollo Rural: Europa invierte en las zonas rurales"

28.

REGIONAL ACTION PLAN ABOUT WATER TECHNOLOGY INNOVATION. IWATERMAP PROJECT

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ABSTRACT

The iWATERMAP project is one of the projects financed by the Interreg Europe program in which the Murcia Region participates. Interreg Europe enables solutions to be shared between different regions for the development of better policies, ensuring that government investment, innovation and implementation efforts lead to an integrated and sustainable impact for people and place.

New ways of obtaining water are currently being researched, improving water efficiency, but also good practices that are based on training are essential, and policies often support them. Currently, policies boost private investment to achieve quality solutions.

AGROFOOD Murcia has worked to establish the issues of interest for the Region of Murcia, raise them at an interregional level and develop a roadmap that provides achievable measures for innovation in the water sector in 3 aspects: Critical Mass, Human Capital and Internationalization. Finally, it has developed an Action Plan with different activities, including the inclusion of a thematic block on water in the agri-food industry in the International Symposium on Food Technologies, which is held every two years, and is a meeting forum for the critical mass of the agri-food sector consolidated in our Region and with international impact.

Acknowledgments: This project has been funded by INTERREG EUROPE, European Union, European Regional Development Fund with ref.: PGI05062

More information: https://www.interregeurope.eu/iwatermap/

29.

SOLIEVA PROCESS AS SOLUTION FOR ENVIRONMENTAL RISK RELATED TO UNTREATED TABLE OLIVE PRODUCTION WASTEWATER (TOPWW) ACCUMULATION PONDS. POLYPHENOLS, A HIGH ADDED VALUE ORGANIC COMPOUND

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ABSTRACT

The wastewater from the processing of table olives (TOPWW) contains a high content of organic matter and salts from the industrial process itself, which make its management difficult. Specifically, the presence of phenolic compounds, such as hydroxytyrosol (2- (3,4-dihydroxyphenyl) ethanol), represents one of the main problems for their treatment, mainly because they are hardly biodegradable and, secondly, because of their important activity antimicrobial, which reduces the efficiency of biological processes in wastewater treatment plants. And to this should be added the high consumption of water, which generates large volumes of discharge. On the other hand, recovering valuable polyphenols to be used in the food and health industry opens an opportunity to create new business models following the principles of industrial symbiosis.

In the tasks of the project "Circular economy applied to the treatment of table olives brines based on solar evaporation", financed by the LIFE program of the European Union with the acronym LIFE SOLIEVA, it has been possible to demonstrate the technical viability of recovery of organic compounds (OCR) in process waters from the production of table olives, achieving an extract rich in phenolic compounds. TOPWW have been characterized, concentrated, atomized and purified, trying to optimize a process of interest to the sector.

Acknowledgments: This project is financed by the LIFE Programme 2014-2020 of the European Union for the Environment and Climate Action under the project number LIFE17 ENV/ES/000273.

More information: https://www.lifesolieva.eu/

30.

SEAWEEDS AS A FUNCTIONAL INGREDIENT FOR A HEALTHY DIET

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ABSTRACT

Seaweeds have been used since ancient times as food, mainly by Asian countries, while in Western countries, their main application has been as gelling agents and colloids for the food, pharmaceuticals, and the cosmetic industry. Seaweeds are a good source of nutrients such as proteins, vitamins, minerals, and dietary fiber. Polyphenols, polysaccharides, and sterols, as well as other bioactive molecules, are mainly responsible for the healthy properties associated withseaweed. Antioxidant, anti-inflammatory, anti-cancer, and anti-diabetic properties are attributed to these compounds. If seaweeds are compared to terrestrial plants, they have a higher proportion of essential fatty acids as eicosapentaenoic (EPA) and docosahexaenoic (DHA) fatty acids. In addition, there are several secondary metabolites that are synthesized by algae such as terpenoids, oxylipins, phlorotannins, volatile hydrocarbons, and products of mixed biogenetic origin. Therefore, algae can be considered as a natural source of great interest, since they contain compounds with numerous biological activities and can be used as a functional ingredient in many technological applications to obtain functional foods.

31.

UPCYCLING OF PE & PET WASTES TO GENERATE BIODEGRADABLE BIOPLASTICS FOR FOOD AND DRINK PACKAGING

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ABSTRACT

Plastic packaging, which make up nearly 60% of the total plastic waste in Europe, is highly problematic from a waste management- and environmental- point of view due to their durability and resistance to degradation. Polyethylene (PE) and Polyethylene terephthalate (PET) are the leading plastic use in food and drink packaging (43% PE and 19% PET). The sustainable management of this plastic waste has become a very challenging problem for global society.

upPE-T offers an innovative solution for the upcycling PE and PET post-consumer packaging wastes by transforming them into a range of biodegradable & recyclable bioplastics (PHBVs) for food & drink packaging manufacturing. As an alternative for plastic chemical degradation, PE and PET waste streams will be recycled via enzymatic degradation and microbial metabolism.

32.

CHARACTERIZATION OF THE VOLATILE PROFILE AND IDENTIFICATION OF MICROBIAL GROWTH IN POMEGRANATE JUICE BY USING ION MOBILITY SPECTROMETRY

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ABSTRACT

Pomegranate (*Punica granatum* L.) is widely recognized for its health benefits in the human diet. The chemical composition of pomegranate depends on the growing region, climatic and storage conditions, cultivation practices and degree of maturity. Microbial contamination is a serious concern for the food industry because of the significant economic and commercial loss it generates. The yeast *Saccharomyces cerevisiae* is widely used in food industry because it is considered a safe microorganism for food and beverages, including fruit juices. In this work, headspace - gas chromatography (HS-GC) coupled to ion mobility spectrometry (IMS) is proposed for the first time as an alternative to the traditional plate counting in order to detect and quantify the microbial growth in pomegranate juice. For this purpose, a monitoring of pomegranate juice samples containing *Saccharomyces cerevisiae* was carried out over two weeks, and two types of preservatives (a sorbate/benzoate mixture and a natural preservative from vegetable material) were used to study the variability of the samples under different conditions. The chemical fingerprints of the samples were obtained and their evolution was studied over time, as well as pH and water activity measurements. After data treatment, orthogonal partial least squares-discriminant analyses (OPLS-DA) models were performed to detect contaminated pomegranate juice and to assess the concentration level of microbial contamination, obtaining a validation success of 100 and 90.91 %, respectively. Furthermore, ethyl acetate, ethyl butyrate and limonene were detected and identified in the pomegranate juice profile.

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33.
APPLICATION OF ADVANCED DATA ANALYSIS TECHNIQUES IN FOOD SHELF-LIFE STUDIES

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ABSTRACT

The food shelf-life study is a fundamental procedure to guarantee food safety, as well as other different technical attributes, both in the case of fresh foods, and those suffering some kind of process. In accordance with the legal requirements under 1169/2011 (EU) Regulation, about food information provided to consumers and 2073/2005 (EC) Regulation, on microbiological criteria applicable to food stuffs, the food business operators must carry out and validate useful shelf-life studies that justify that the date printed on the food packaging agrees with the right food condition.

Food shelf-life experimental study requires a strategy that justifies the choice of the time and environmental conditions in which the storage of a product can take place. Understanding the temporal evolution of a food requires assuring nutritional information, and the absence of alterations of different attributes with respect to the initial state. Having all this information requires a long and complex process, which sometimes becomes unfeasible for the food companies.

Any technological innovation that affects the development of a product, packaging or the main manufacturing process, needs to determine its shelf-life period with minimal guarantees. To overcome the temporal limitation necessary for this study, once the microbiological stability of the product has been demonstrated, the use of accelerated shelf-life studies is frequently used, in order to obtain results that could be extrapolated to the real evolution of the product under retail's storage conditions.

The general purpose of the project is to improve the precision and predictive capacity of accelerated food shelf-life tests, using advanced data analysis techniques. To achieve this objective, different advanced methodologies for modelling, calculation, statistical analysis and artificial intelligence techniques will be used, which will allow conclusions to be drawn about the shelf-life of food, based mainly on the information obtained from accelerated aging tests.

To achieve this objective, the following goals are required:

- Identification and assignment of the shelf life's limiting factors for each food.

- Design of optimal environmental conditions for accelerated shelf-life studies, which allow to increase the reaction rate, safeguarding the organoleptic properties of the food, thanks to the use of multivariate statistical techniques.
- Design of shelf-life temporal programming for the monitoring of microbiological, physical-chemical and organoleptic properties of food. Use of artificial intelligence's procedures to assign the right evolution of different foods.
- Parameterization of the kinetic factors of reaction speed, and influence of the environmental conditions on the different food attributes. Use of artificial intelligence's procedures to assign a correct evolution of the kinetic parameters.

The achievement of these specific goals would allow food companies to assure food safety and predict in a more precise and exact way the temporal evolution of different food attributes, and to identify, quantify and improve the shelf-life limiting factors.

For any additional information regarding this project:

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34.

INDUCTIVELY COUPLED PLASMA MASS SPECTROMETRY IS NOT AN INDISPENSABLE ANALYTICAL TOOL FOR MEASURING VERY LOW CONCENTRATIONS OF METALS IN WATERS AND FOODS

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ABSTRACT

Plasma-based techniques have gained relevance in the analytical laboratory. Especially inductively coupled plasma mass-spectrometry (ICP-MS) is a powerful analytical tool that is nowadays widely used for the determination of very low concentrations of metals and metalloids in a variety of samples, including waters and foods. The attainable sensitivity and its multi-elemental character, as well the rapidity in the measurement, are important characteristics that have led in such widespread use, sometimes resulting even in abuse. The advantages are undeniable, but the high cost of acquisition and maintenance of the instrument put this technique beyond the reach of laboratories with a small budget. In contrast, atomic absorption spectrometry (AAS) is a lower-cost technique that is present in virtually all laboratories, and is now often underutilised as it is displaced by more expensive plasma-based instruments. When an appropriate sample preconcentration procedure is used in conjunction with an AAS instrument provided with an electrothermal atomizer (ETAAS), analytical procedures of very high sensitivity, comparable or even better than those achieved with plasma-based techniques but at a much lower cost per analysis, are obtained. Preconcentration can be done by liquid-liquid or solid-liquid microextraction, so that the analyte present in a relatively large volume of sample is finally transferred to a small volume of liquid, increasing its concentration and facilitating the subsequent analytical measurement. Of particular interest are recent procedures that use magnetic nanoparticles to carry out the liquid-solid preconcentration process, since the tedious centrifugation step is avoided as the separation is achieved by means of a simple magnet.

This communication summarises some of the advances recently developed in this sense in our laboratory which demonstrate that, as indicated in the title, the ICP-MS instrument is not absolutely mandatory in the analytical laboratory since at least part of its tasks could be carried out by means of the mentioned preconcentration stage coupled to an ETAAS final measurement.

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35.

DO RUBBER NETTINGS CONTRIBUTE TO THE N-NITROSAMINES CONTENT OF HAM MEAT SAMPLES?

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ABSTRACT

Food security is attracting increasing attention worldwide, especially in regard to the meat industry, which offers numerous products whose safety must be monitored for health preservation. Nitrosamines (NAs), which are catalogued as carcinogenic compounds by the International Agency for Research on Cancer, may be present in meat products, due to the conversion of nitrites (used as preservatives) into NAs and as a result of migration from the materials that come into contact with the product such as packaging papers, waxed containers and, especially, elastic rubber nettings. During the rubber vulcanization process involved in the synthesis of these materials, the accelerators or stabilizers used can originate NAs themselves or amine derivatives, which are present at higher concentrations than the NAs, and which can migrate to the meat.

This work evaluates the effect of elastic rubber nettings on the contents of twelve NAs in ham meat samples. The procedure is based on the combination of ultrasound-assisted extraction and preconcentration of NAs from cooked ham samples using dispersive liquid-liquid microextraction (DLLME) with methanol as dispersant solvent and chloroform as extractant solvent. An evaluation of the effect of elastic rubber nettings on the levels of twelve NAs in meat products established that there is no relationship between the elastic rubber nettings used in the manufacturing process and the NAs the products contain, since there were no differences between the levels found in the products made with several plastics or thread in the presence of additives. In addition, a temperature study revealed that there was only a very slight variation in the concentrations of the NAs at the different temperatures to which the samples were submitted.

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36.

RED AND FAR-RED LED LIGHTING AS POSTHARVEST STRATEGY TO ENHANCE PHYTOCHEMICALS IN BROCCOLI SPROUTS

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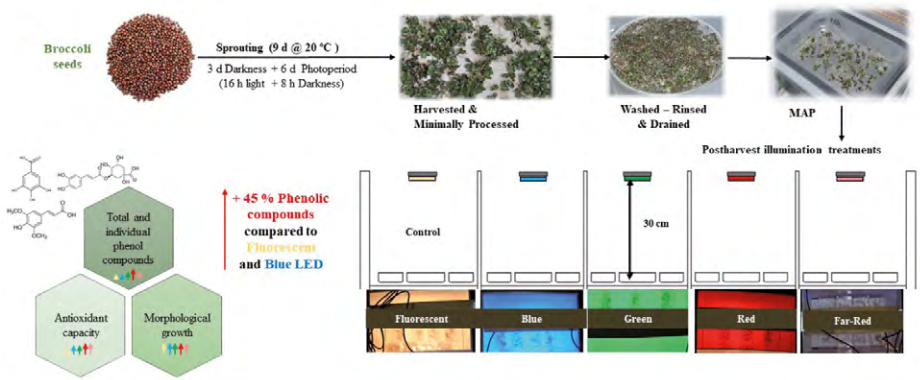
ABSTRACT

The **objective** was to evaluate the morphological and phytochemicals content changes in minimally processed broccoli sprouts grown under a photoperiod 16 h light + 8 h darkness which were illuminated during 15 d at 5 ºC with Blue, Green, Red, and Far-Red LEDs. Fluorescent light was used as control (CTRL). Broccoli sprouts under LED lighting did not affect the normal morphological development during the postharvest storage. Sprouts under Blue, Green, Red, and Far-Red LED lighting improved the total antioxidant activity (TAC) by DPPH after 8 d at 5 ºC by 65, 37, 58, and 55 %, respectively, compared to CTRL. Nevertheless, just Red and Far-Red treatments maintained such TAC increments after 15 d at 5 ºC. Similarly, TAC by ABTS revealed that just Red LEDs were able to increase the antioxidant ability by 26 % after 15 d at 5 ºC. These results are in accordance with the increase in the total phenolic compounds, in where Red LEDs illuminated sprouts during 15 d at 5ºC showed an increase by 45 % in comparison with Fluorescent and Blue LEDs. The sinapic acid and their derivatives corresponded with the 78 % of those phenolics while the 21 % corresponded to chlorogenic and neochlorogenic acids. Gallic acid represented 1 %. In **conclusion**, our results suggest that minimally processed sprouts may benefit from LED lighting during shelf-life in terms of their nutraceutical compounds, especially under Red and Far-Red illumination.

Keywords: *Brassica oleracea* var. *italica*; light emitting diode; fresh-cut; bioactive compounds; antioxidants; phenols.

Graphical abstract



37.

CONTROL OF MIGRANTS FROM PLASTIC PACKAGES TO HONEY SAMPLES USING TARGETED AND UNTARGETED ANALYSIS BY GAS CHROMATOGRAPHY-MASS SPECTROMETRY

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ABSTRACT

Honey is a natural high-quality product considered as a functional food due to its nutritional and medicinal properties, such as antioxidant, antibacterial, antiviral, anti-inflammatory, anti-thrombotic and antic-allergic capacities. These recognized beneficial properties have led to its increasing consumption and make the quality control of honey of great importance. In this work, targeted and untargeted analysis by gas chromatography-mass spectrometry (GC-MS) is proposed to monitor potential migrants from polystyrene and polyethylene terephthalate honey plastic packaging [1,2]. These materials usually contain additives which may migrate into the food and therefore be ingested by consumers, representing a health risk. The application of dispersive liquid-liquid microextraction (DLLME) as a preconcentration technique allowed very low detection limits to be reached for all the substances. Fifteen target compounds, including styrene, phthalates, fatty acids, alkylphenols and bisphenol A, were quantified in the honey samples at concentrations in the 15.3-334 ng g^{-1} range. None of the studied samples exceeded the maximum levels allowed by European legislation.

The identification of thirteen putative compounds (two phthalates, four acids, three esters, one aldehyde, one hydrocarbon and two alkylphenols) was carried out by the application of an untargeted methodology based on the application of electron ionization MS detector operating in full scan mode as well as the usage of MS database libraries (NIST and Wiley). The proposed method was seen to be a useful approach for the quantification and identification of potential migrants from plastics in challenging samples such as honey.

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38.

NATIONAL REFERENCE CENTRE IN FOOD INDUSTRY, CANNED VEGETABLES AREA. TRAINING, INFORMATION, INNOVATION, DEVELOPMENT AND EXPERIMENTATION

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ABSTRACT

The National Reference Centres (NRCs) are innovation and experimentation centres that act as an institution at the service of vocational training systems to facilitate their competitiveness and quality, and to respond to changes in the demand of qualifications in productive sectors.

They are distinguished for programming and executing innovative, experimental and formative actions in the field of training, in such a way that they serve as a reference for the whole of the National System of Qualifications and Vocational Training, in the field of their family or professional area and for the whole Spanish territory.

With absolute innovative vocation, and currently dependent on the Ministry of Education and Vocational Training and the Regional Ministry of Water, Agriculture, Livestock, Fisheries and Environment of the Region of Murcia, with the collaboration of the State Public Employment Service (SEPE), Ministry of Labour and Social Economy, the NATIONAL REFERENCE CENTRE FOR FOOD INDUSTRY, AREA OF CANNED VEGETABLES (NRC-CV) was officially created in 2015 in Molina de Segura (Murcia).

There are several strategic objectives and areas of action of the CRN-Canned Vegetables. In short, the RNC-CV mainly INNOVATES, TRAINS, INFORMS, DEVELOPS and EXPERIMENTS.

Being NRC means to be a reference in development, experimentation and transfer of knowledge and technology, innovating by training the professionals of the future within the sector, with the most innovative techniques that exist at all times and on cutting-edge topics; it means interacting with the sector, technology and research centres, facilitating all intellectual, innovative and productive transfer.

In short, everything that helps in the development, competitiveness and satisfaction of the qualification needs of workers in this productive sector.

More information: https://www.crnconservasvegetales.es

Región de Murcia
Consejería de Agua, Agricultura,
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Dirección General de Agricultura,
Industria Alimentaria y
Cooperativismo Agrario

39.

IMPROVING THE QUALITY OF BREAD BY USING DEHYDRATED SOURDOUGH

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ABSTRACT

There is a strong tendency in Northern and Western Europe for obtaining industrial bread with the quality as close as possible to the traditional - artisanal one, which is very appreciated by consumers. Sourdough is a mixture of flour and water that is fermented either spontaneously or by the addition of lactic acid bacteria. The lactic acid bacteria and yeast fermentation generates a complex mixture of organic compounds that have a strong impact on the rheology of the dough and the final quality of the bakery products. The use of dehydrated sourdough in industrial bread making processes represents a useful and easy to use technology for integration the properties of a traditional bread into an industrial one. There are two types of dehydrated sourdough:

- inactive - obtained after a complete fermentation process, dried, with all the active elements - lactobacilli, yeasts - totally deactivated but suitable for direct manufacturing processes, involving short fermentation times,
- active - obtained in the same way as inactive dehydrated sourdough but with addition of lactic bacteria that are activated during the manufacturing process producing extra flavour, taste and acidity. These are recommended for delayed fermentation processes.

The aim of this paper is to study the effect of dehydrated sourdough addition on the physicochemical and sensorial properties of white and whole meal bread. The evaluated characteristics were: volume, porosity, acidity, elasticity, crust appearance, crumb appearance, flavour, taste, smell and total acceptability. The quality of bread obtained with dehydrated sourdough was improved: higher volume, better elasticity and porosity, higher acidity, more pleasant flavour and taste, higher score for total acceptability.

Keywords: bread, dehydrated sourdough, sensory properties.

40.

USE OF HEADSPACE GAS CHROMATOGRAPHY – ION MOBILITY SPECTROMETRY FOR FRAUD DETECTION IN THE FLORAL ORIGIN OF HONEY

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ABSTRACT

Nowadays, many types of honey from different botanical origin are available in the market. They differ in their organoleptic properties such as color, flavor or smell. Moreover, the commercial value of honey is directly related to its authenticity, being the discrimination of its floral origin of utmost importance to reinforce consumer confidence. Thereby the interest in honey characterization relating to floral origin is increasing. In this work, the instrumental technique headspace gas chromatography coupled to ion mobility spectrometry (HS-GC-IMS) is used for monitoring honey volatile compounds that allow the differentiation and characterization of honey samples according to their floral origin. IMS is a state-of-the-art analytical technique based on the gas phase separation of ions, according to their charge, mass, size and shape, in a drift tube under the influence of a constant electric field at atmospheric pressure. However, the coupling GC-IMS generates complex multi-dimensional data, whose interpretation is a challenge requiring an exhaustive chemometric processing.

The analytical procedure consists of the incubation of 1 g of honey at 100 ºC for 15 min and the injection of 750 µL of the sample headspace in the GC-IMS equipment. Compounds are ionized in positive ion mode, and separated in a drift tube operating with a constant voltage at 80 °C. For development of the chemometric model, a total of 96 samples from ten different floral origins (orange blossom, albaid, rosemary, thousand flowers, thyme, broom, lavender, melon, oak and heather) were analyzed.

The data processing is based on a non-targeted strategy using peak-region features (markers). A total of 275 markers were manually selected. Orthogonal partial least squares analysis chemometric model was constructed using the 80% of the samples and the remaining 20% were used for method validation, the intensity of the reactant ion peak being used for normalization. This chemometric model allowed the classification of honey samples into five groups named, albaid, thousand flowers, rosemary, orange blossom and other floral origins (including the rest of investigated floral origins, which due to the number of available samples could not build an individual group) with success validation rate of 100%.

Finally, in order to demonstrate the suitability of the proposed methodology, a total of 14 unknown honey samples were analyzed and classified attending to their floral origin. Two of them were classified as orange blossom, seven samples as thousand flowers, one sample as albaid and the rest belonged to another floral origin.

Acknowledgements: The authors acknowledge the financial support of Fundación Séneca (Project 19888/GERM/15) and the Spanish MICINN (Project PGC2018-098363-B-100). The authors also extend their appreciation to the Spanish MCIU for granting the Network of Excellence in Sample preparation (RED2018-102522-T).

41.

INCREASING FOOD LITERACY COMPETENCIES OF ADULTS. FOODTR

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ABSTRACT

Nowadays there is an increase in the number of homemade food producers (retired people, unemployed people, etc.) who want to increase their income. However homemade food producers should have knowledge about the proper processing techniques of food products. There is a need of learning material for people who plan to make and sell food from their home.

The **short-term** impact of the project: FOODTR project will provide innovative guides platform about food literacy for adults with low skills and competence to enhance their knowledge in food literacy. Food literacy knowledge of people will be enhanced with international cooperation. They become more aware while they are preparing their meals, making food selection and storing & packaging.

The **long-term** outcomes of the project: Health promotion and disease prevention will be achieved. With increased food related skills, many adults may start food business from their homes. By this means, they contribute to their home-income and they become socially included. Also, the project helps to make the shift to a more sustainable and healthy food system.

Outputs will help to enhance the quality of learning and increase key competences of adults about digital learning. Target groups will be able to download the textbooks and read them offline whenever they want.

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FOODTR


TÜRKİYE ULUSAL AJANSI
TURKISH NATIONAL AGENCY
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Alimentación
TFTAK


SZÉCHENYI
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BURSA TEKNİK ÜNİVERSİTESİ
2010

42.

LOCAL DEVELOPMENT AND CROSS BORDER COOPERATION IN THE AREA OF AGRICULTURAL PRODUCTS AND TRADITIONAL FOOD - LOC FOOD

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ABSTRACT

The project: "Local development and cross border cooperation in the area of agricultural products and traditional food" - LOC FOOD is Joint Operational Programme Black Sea Basin 2014-2020 and is co-financed by the European Union through the European Neighbourhood Instrument and by the participating countries: Armenia, Bulgaria, Georgia, Greece, Republic of Moldova, Romania, Turkey and Ukraine.The main objective of the project is to put in value the strong tradition of local food production in countries from Black Sea Basin Region (Greece, Romania, Moldova, Ukraine and Bulgaria). Agricultural and food sectors represent relevant economic factors for the development in the area. In order to achieve the objective, the following main tasks will be carried out:

- Identifying the high quality traditional food producers and create a data base with producers and their selected products;
- Analysing the current situation, legislative, environmental and market aspects reporting on the best practices for other EU countries;
- Organise training events for the farmers and producers;
- Promoting local food specialities by producing food guides and encouraging culinary tourism;
- The products selected will be included in Geographic Informatic System Mapping;
- Submit selected foods for getting the Traditional Speciality Guaranteed, Protected Designation of Origin, Protected Geographical Indication and Organic Farming EU labels.

Keywords: traditional food, food producers, EU labels.

Aknowledgments: Joint Operational Programme Black Sea Basin 2014-2020.

43.

INTENTIONALLY AND NON-INTENTIONALLY ADDED SUBSTANCES FROM PLASTIC PACKAGING MATERIALS: A SHORT REVIEW

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ABSTRACT

Food contact materials (FCMs) are used to obtain food contact articles (FCAs), including food packaging, food storage containers, food processing equipment, but also, machinery, kitchen- and tableware, that come into contact with food and beverages during, the entire food supply chain. These FCAs and FCMs are made of base materials, like plastics, paper and board, metal or glass, and different chemical substances, intentionally added substances (IAS) or non-intentionally added substances (NIAS), generally known as food contact chemicals (FCCs) [1,2]. The IAS are essential in the manufacturing or use of the FCAs, because they enhance, the manufacturing process, stability of obtained products, mechanical properties, increase the shelf-life of the packaged food, such as monomers, prepolymers, antioxidants, lubricants, and impact modifiers [3]. Compared to IAS, NIAS are not added for a specific purpose or any technical function, but are present in the final product. These FCCs may include impurities, contaminants, reaction byproducts and side products, degradation products and newformed compounds [2]. In certain condition, these chemicals, can migrate from packaging to foodstuffs, being regulated with maximum limits that may migrate into food products without causing any health concerns. Among the FCCs, the most analyzed are bisphenols (such as Bisphenol A), phthalates, such as, (2-ethylhexyl) phthalate (DEHP), diethyl phthalate (DEP), diisobutyl phthalate (DIBP), dibutyl phthalate (DBP), formaldehyde, Per- and polyfluoroalkyl chemicals (PFASs), including Perfluorooctane sulfonate (PFOS) and perfluorooctane acid (PFOA), Primary aromatic amines (PAAs), Mineral oil hydrocarbons (MOHs), including mineral oil saturated hydrocarbons (MOSH) and mineral oil aromatic hydrocarbons (MOAH). For these substances and for many others presented in the EU Regulation no. 10/2011 are presented the specific migration limits (SML) who are set for individual authorized substances based on toxicological evaluation [4].

Keywords: food safety, food contact materials, intentionally added substances, non-intentionally added substances

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44.

DEVELOPMENT OF INNOVATIVE PRODUCTS WITH FISHERY SPECIES OF LOW COMMERCIAL VALUE OR FISHING DISCARDS. NOVELFISH PROJECT.

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ABSTRACT

Currently there is a significant problem with unwanted by-catches and discards. The Common Fisheries Policy (CFP) requires their landing, but this represents an added problem to ship owners and fishermen as they do not have the means and tools to manage these unwanted catches. The Novelfish project is presented as an alternative to use these by-catches by transforming them into innovative products with high added value, commercial interest and zero residue, promoting the economic and environmental sustainability of the fishing sector. During the development of the project, different actions were carried out, starting with a study of unwanted by-catches (volume, species, seasonality) in fishing areas of Spain (FAO 34 and 37) and subsequent selection of the markets and raw materials of interest. Horse mackerel, redfish, gurnard and "trash fish" of Mediterranean and Atlantic were use as raw materials to elaborate fish sauces by fermentation. Other products such as pates and condiments were made from the solid residue by-product of fermentation, making the most of raw materials and generating zero residue.

In short, the innovative, differentiating and unique nature of the products developed and the zero residue process represent a competitive advantage in the market, opening up a new way of using the unwanted by-catches that are currently being landed.

45.

AN OBJECTIVE AND EASY-TO-USE NIR-BASED SOFTWARE FOR FOOD QUALITY CONTROL

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ABSTRACT

In the food industry, powdered products are about 40% of the human consumption. Moreover, pure ingredients and powdered blends are used by food companies in the production of their final recipes. Quality control for these type of ingredients (and even for the final powdered products) is a challenge for most manufacturers as there are not specific methods that can provide reliable results. Adulterations and food safety failures are difficult to detect in this kind of products.

Therefore, there is a real need to implement a methodology to perform quality control in a more reliable, faster and easier way, that can be conducted by any minimally trained technician, avoiding human error and providing reliable levels of identification and minimizing risks, while, at the same time, increasing a company's food-safety standards and establishing a precise and fully replicable quality-control process.

NIR technology combined with chemometrics have proven to be a good alternative to perform inline and online quality control. With this technology, it is possible to analyze any powdered product, determining the composition, homogeneity and compliance of new samples. This technique provides the industry with an objective and reliable tool to ensure the composition and functionality of food products.

In this work, we propose the use of Chemometric Brain software as a service (Saas) to provide the industry with an easy-to-use, objective and automatic technique in order to perform more complete and accurate analysis of samples to ensure quality and food safety: identification, properties determination and even the composition in terms of ingredients and percentages, in case of blend products.

CHEMOMETRIC **BRAIN**

46.

ENZYME-ASSISTED EXTRACTION OF HIGH-VALUE BIOACTIVE POLYPHENOLS FROM FRUIT BY-PRODUCTS

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ABSTRACT

Fruit processing generates large amounts of by-products containing high valuable compounds. In particular, fruit by-products represent a great source of phenolic compounds with antioxidant, antihypertensive, and anticarcinogenic properties, among others. Usually, the extraction of bioactive polyphenols is carried out using conventional extraction methodologies. Nevertheless, these methodologies do not provide an efficient extraction since phenolic compounds remain retained in the residue of the extraction.[1] For this reason, this work proposes enzymatic-assisted extraction (EAE) as an efficient, selective, and sustainable alternative, in comparison with alkaline and acid hydrolysis, for complete extraction of bioactive phenolic compounds from the residue of conventional extraction from fruit by-products.[2] A high-performance thin-layer chromatography method with UV-Vis detection was developed to obtain the phenolic profile for extracts obtained from tropical fruit peels. The most intense bands were further analyzed by direct analysis in real-time coupled to high-resolution mass spectrometry. Total phenolic and proanthocyanidin contents and antioxidant capacity of the extracts were measured. Alkaline hydrolysis was the most efficient treatment to obtain polymeric polyphenols from fruit by-products, while EAE and alkaline hydrolysis were promising extraction methods to display antioxidant extracts. This work highlights that many polyphenols remain on the extraction residue of fruit by-products after conventional extraction and are not usually taken into account.

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47.

EXTRACTION OF ANTIOXIDANT NON-EXTRACTABLE POLYPHENOLS FROM MANGOSTEEN PEEL USING GREEN SOLVENTS

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ABSTRACT

Mangosteen (*Garcinia mangostana* L.) is a tropical fruit well known for its pharmacological, anti-inflammatory, and anti-tumor properties. Mangosteen peel is a byproduct that presents phenolic compounds with beneficial health effects, and that is usually rejected. Mainly, the extraction of phenolic compounds from plant matrices has been carried out employing aqueous-organic solvents; however, there are bound polyphenols that remain retained in the extraction residue after conventional extraction with organic solvents. They are called non-extractable polyphenols (NEPs). To replace conventional organic solvents, a new generation of more sustainable solvents known as natural deep eutectic solvents (NaDES) has been considered. NaDES present a great potential for extraction processes protecting the degradation of bioactive compounds as well as increasing extraction yields. These solvents are environmentally friendly, easily synthesized, biodegradable, non-volatile, highly stable, and have a low cost. The aim of this work was to develop a green extraction methodology using ultrasound-assisted extraction (UAE) and NaDES for the extraction of antioxidant NEPs from mangosteen peel. Seven NaDES were studied to select the best one to recover NEPs from mangosteen peel. Antioxidant capacity and total phenolic and proanthocyanidin contents of the extracts were evaluated. Choline chloride: lactic acid with a molar ratio of 1:2 was the NaDES selected as the best extraction solvent to release antioxidant NEPs from mangosteen peel. A Box-Behnken experimental design was used to optimize UAE and other extraction conditions such as water content (10-30%, v/v), ultrasound amplitude (30-60%), and extraction time (1-15 min). Results showed that ultrasound amplitude and extraction time have a positive effect on the extraction of antioxidant NEPs from mangosteen peel while the molar ratio of water presented a negative effect.

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48.

VALIDATION OF ADSORBENT MATERIALS AND ADVANCED OXIDATION TECHNIQUES TO REMOVE EMERGING POLLUTANTS IN TREATED WASTEWATER. CLEANUP

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ABSTRACT

Emerging pollutants (EP), mainly through urban wastewater and effluents from wastewater treatment plants (WWTPs), reach aquatic and terrestrial ecosystems, causing negative effects on ecosystem services, and producing a significant environmental impact. LIFE CLEAN UP aims to improve water treatment with efficient and environmentally friendly technology to obtain water free of EP.

The main objective is to develop, validate and demonstrate a system for the elimination of EP and other pathogenic microorganisms that are not eliminated by current water management systems, causing a large environmental and human health impact.

For this purpose, water will be passed through an adsorbent material made from cyclodextrin polymers, which will retain a high concentration of EPs. Afterwards, the water will be treated by an advanced oxidation process, which will degrade the contaminants and possible pathogens that have not been previously eliminated and/or retained.

The project will have very positive consequences at the environmental, economic and health level, since it will facilitate the generalization of very versatile and powerful water treatment technologies, which will contribute to solve a serious environmental and health problem derived from the presence of pollutants in our waters with a high impact on human health and ecosystems.

So far, the main technical result is the validation of a treatment system that eliminates more than 90% of the EP, in addition to ensuring the disinfection of water, allowing a safe reuse of it.

A semi-industrial prototype has been developed for this purpose, installed in an urban WWTP with a treatment capacity of 5m^3/hour. At the end of the project, it is expected that its application will be possible at an industrial level, covering the entire treatment volume of a wastewater treatment plant.

Project Reference: LIFE16 ENV/ES/000169

More info: https://www.lifecleanup.eu/

49.

OPTIMIZATION OF THE PRODUCTION PROCESS OF BAKERY PRODUCTS BY DIGITIZING THE FERMENTATION PROCESS

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ABSTRACT

Currently, digitization has an almost transversal presence, adapting and facilitating the processes previously carried out in a traditional way, defining strategies in information systems, carrying out diagnoses, identifying vulnerabilities and developing measures to mitigate them.

The objective of the present study is to develop an automated system for the process of entry and exit of the carts of pastry product to the fermentation chamber, avoiding the human factor, promoting the control and recording the manufacturing parameters.

A PLC with 4 antennas has been placed, 2 at the entrance of the camera and 2 at the exit. An RFiD Tag was installed in each cart, which was always visible, in order to be able to be read at any time. A software was developed to record the movements and show the degree of fermentation of the product in real time so, once the process was finished, a light alarm was activated to alert the operator.

This system has promoted a cessation of the losses obtained at that point of manufacture without compromising the quality of the product. On the other hand, it favors the reproducibility and control of the process.

50.

ENHANCING SOCIAL INCLUSION OF YOUTH THROUGH EMPLOYMENT IN AGRIFOOD SECTOR. AGRIFOOD

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ABSTRACT

The objectives are: to enhance the social inclusion of youth with fewer opportunities (including NEETs), to encourage young people to enter the labour market, to stop migration towards big cities, to promote the development of target group (unemployed youth, future farmers, agrifood professionals, local authorities, NEETs, students at high school or university etc.) to tackle unemployment through free, innovative training materials including topics of Good Agricultural Practices (GAP), Agri-Food Marketing, Agricultural Entrepreneurship, Food Safety and Traditional Processing Technologies, and Value-Added Food Products from Fruits and Vegetables, making sustainable farming activities more attractive for youth.

The project aims to support participants with training and other related activities. The collaboration between partner organizations will increase the quality of activities and output materials. By this means, the results are: to contribute to reducing youth unemployment, to promote the social inclusion of young people, to contribute to reducing the number of young people leaving rural areas, to enhance skills and competencies of youth about agricultural practices and food processing technologies, to increase the awareness of target groups in terms of profitable agrifood activities and to develop Smart, Easy-used, Free of charge, Understandable and Innovative training materials for the target group to promote their qualifications and skills.

The acquisition and the use of knowledge and qualifications will improve personal development, self-esteem, employability skills and participation in the European labour market. Then, young people will get rid of the feeling of exclusion and they will make living in the village an advantage.

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SOCIOS DEL PROYECTO

51.

PASSEURS DE CULTURE – STRATEGIC PARTNERSHIP AND EXCHANGES OF BEST PRACTICES

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ABSTRACT

A project in favor of quality food, local and respectful of the environment coordinated by AANA, Agence de l'Alimentation Nouvelle-Aquitaine, France

The fundamental question is «How to obtain as many as possible high-quality, proximity and environmentally friendly food?»

In front of that question, Passeurs de Culture is designed to enable to the young professional from agrifood supply chain and catering and to the educational teams to develop new skills by the exchange of practices and knowledge to strengthen and update the educational contents.

Passeurs tries to respond to the job market that needs professionals who value and know its gastronomic heritage, its terroir and the challenges of sustainable food for the planet. Passeurs does not want the standardization of supply choices and taste to be the norm. Training organizations must be involved to strengthen their skills in the field of sustainable food. There is a public health issue and economic challenge in promoting local producers/products and sustainable food.

The main objectives are to improve the level of skills and abilities of students and teaching staff in the fiels of sustainable food and local productions, to increase the employability of young people with the provision of free educational resources, to promote intercultural exchange on European diversity and culinary heritage, etc. Furthermore, the project aims to equip the students with language and cultural competences – improve foreign language skills, and better understanding of other cultures

The target groups are young professionals in the food and drink/hotel/agriculture/food sectors, teachers and the technicians of tourist offices, local collectivities, etc.

Passeurs de Culture will allow to sensitize young people to the projects construction at european level so they can develop positive attitudes in favor of Europe and its intangible heritage. **Passeurs will set the scene for the construction of a European Route of Flavors and involve the young people in this task.**

PARTNERS

Passeurs de Culture is coordinated by AANA (Agence de l'Alimentation Nouvelle-Aquitaine, France)

52.

ASSESSING THE BIOREFINERY POTENTIAL OF TOMATO POMACE: CHEMICAL CHARACTERIZATION, BIOACTIVE PROFILE AND ENZYME DIGESTIBILITY

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ABSTRACT

The aim of this study was to characterize the profile of main components and bioactive compounds, and the antioxidant activity of tomato pomace (TP) originated during tomato processing. TP was subjected to freeze dry and to oven dry treatments for their evaluation as storage treatments. The extractable and non-extractable bioactive compounds from TP were obtained through conventional extraction methods. These methods were compared with an enzyme-based extraction process. The polyphenols profile of these extracts was assessed by high-performance HPLC-DAD. In addition, digestibility of the freeze-dried and oven-dried TP was evaluated by different commercial enzyme preparations. Comprehensive information of the chemical composition, bioactive profile, and antioxidant capacity after different storage treatments of by-products from the tomato processing industry is critical to establish the most appropriate technologies for their exploitation. These technologies could benefit the tomato processing industry by increasing its product portfolio as well as reducing its environmental footprint.

53.
UTILIZATION OF CITRUS WASTE AND BY-PRODUCTS

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ABSTRACT

Citrus fruits are one of the most popular fruit crops cultivated throughout the world. Citrus fruits are highly consumed worldwide as fresh product and juice. Comprising nearly forty to fifty percent of the fruit portion, citrus waste which contains peels, pulp, membrane residue and seeds is a by-product of citrus fruit processing. The citrus waste is often discarded to nature. The significance of valorization of citrus waste to develop a sustainable bio-economy and reduce detrimental effects of citrus waste on environment have been thoroughly evaluated. Recently, functional utilization of citrus waste has been investigated for producing added value products, innovating future materials, and promoting zero remaining waste for nature using by innovative technology.

Citrus wastes are rich for essential oils, and natural antioxidants (i.e., phenolic acids, flavonoids and carotenoids) which can be used for food, cosmetic, personal care and pharmaceutical products and medical industries. Also, organic acids derived from citrus waste are transformed into biodegradable polymeric materials, carbohydrate polymers (such as pectin, soluble dietary fiber). Through fermentation process, citrus wastes can be transformed into biogas, bioethanol, or volatile compounds, which harbor commercial importance.

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