Centro Tecnológico Nacional de la Conserva y Alimentación

herbs 4 youth

HERBAL INITIATIVE FOR YOUTH – BRIDGING THE OCEAN

BOOK OF ABSTRACTS

HERBS4YOUTH Final Conference and Networking Meetings

Murcia (Spain), 23-26 January 2018

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Foreword

HERBS4YOUTH project introduced innovative educational and training methods including Open Education Resource with 3 educational chapters Collection/Cultivation/Processing and online monitoring system within the herbal incubators in the partner countries – Costa Rica, Brasil and Jamaica for youth in poverty.

The project increased capacities of the entities from Costa-Rica, Brazil and Jamaica for vocational education, training and quality in the work with Youth in the field of collection, cultivation and processing the medicinal and aromatic plants and to increase mobility for workers with Youth into the Project partner countries. Among the targets was to introduce innovative production of herbal products by Youth and organizations working with Youth and support the entrepreneurship of Youth and organizations working with Youth.

The mobility of workers with Youth from EU countries to selected Latin America countries have increased the capacities of the partner organizations working with Youth and their involvement into the Fair-Trade network and also the mobility participants from EU countries brought the expertise in the fields of Youth work and Herb cultivation and processing from these specific countries with wide range of plant variety.

HERBS4YOUTH Consortium

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Partners

	Outward Bound, Costa Rica
	UCAM - Universidad Católica de Murcia, Spain
	Széchenyi István Egyetem, Mosonmagyaróvár, Hungary
	GoBrazil, Maceió(Alagoas), Brazil
	CTC - Centro Tecnológico Nacional de la Conserva y Alimentación, Molina de Segura(Murcia), Spain
	Centre Tecnològic Forestal de Catalunya, Spain
	4H-Club, Linsted, Jamaica
	Občianske združenie No Gravity, Slovak Republic

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Herbs4Youth Project
Final Conference and Networking Meetings

AGENDA

Tuesday 23d January 2018. UCAM/Murcia
Meeting with researchers of UCAM and CEBAS.

CEBAS is a multidisciplinary public centre with three different areas of investigation: Agricultural Sciences, Food Science and Technology and Natural Resources.

UCAM Universidad Católica San Antonio de Murcia is a private university founded in 1996 partner of the HERBS4YOUTH project.

Visit to UCAM facilities.

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Wednesday 24th January 2018. PROEXPORT/Murcia

Visit to PROEXPORT, Murcia.

The Association of Producers-Exporters of Fruits and Vegetables of the Region of Murcia (PROEXPORT), constituted in 1975, brings together 53 groups of companies and leading cooperatives in the export of fruits and vegetables in the Region of Murcia. PROEXPORT associates put in the market close to one million tons of tomato, lettuce, broccoli, cauliflower, melon and other vegetables, directly employing more than 30,000 workers. PROEXPORT concentrates more than 70% of the total regional production and export of the aforementioned products, which makes it the driving force of the regional economy. The basic objective of the Association is to defend the profitability of the productions of its associated companies, and for that purpose it is actively working on the modernization of both the legal framework and the agrarian structures of production and sectoral marketing.

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Thursday 25th January 2018. UCAM/Murcia
FINAL CONFERENCE

PROGRAME / *PROGRAMA*

Presentation / *Charla*	Speaker / *Ponente*	Photo / *Foto*
Opening Act: Presentation of the ERASMUS + project HERBS4YOUTH ***Acto de Apertura: Presentación del Proyecto ERASMUS+ HERBS4YOUTH.***	Gabriel Adamek, Daniel Amariei, No Gravity, Slovaquia.	 
Comparative analysis of production and market of medicinal and aromatic plants in Costa Rica, Jamaica and Brazil. Current situation and opportunities. ***Análisis comparativo de la producción y el mercado de plantas aromáticas y medicinales en Costa Rica, Jamaica y Brasil. Situación actual y oportunidades.***	Eva More, Forest Sciences Centre of Catalonia Consortium, CTFC, Spain	

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Trade legal assessment for plants from Costa Rica, Jamaica and Brazil as ingredients / additives / food / supplements addressed to the European market. ***Valoración legal de cormercialización de plantas de Costa Rica, Jamaica y Brasil como ingredientes / aditivos / alimentos / complementos en el mercado europeo.***	Astrid van Ginkel, FITOMON, Spain	
Herbs4Youth greenhouses in Costa Rica. ***Invernaderos de Herbs4Youth en Costa Rica.***	Daniel Jiménez Program Director, Outward Bound School Costa Rica.	
The use of medicinal plants in Brazil and its origin. ***El uso de plantas medicinales en Brasil y su origen.***	Jose Crisologo de Sales Selva y Luan Lucas Cardoso Lima, Universidade Estadual de Alagoas, Departamento de Zootecnia, Brasil.	
Science behind herb production: scientific background and ecophysiological aspects to be considered for the production of good quality herbs (MAPs) under different climatic conditions. ***La ciencia tras la producción de***	Dr. Akos Mathe, Chair of Genetic resources and wild-crafting of MAPs Group of ESCORENA NETWORK, Hungary	

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hierbas: antecedentes científicos y aspectos ecofisiológicos a considerar para la producción de hierbas de buena calidad (MAP) bajo diferentes condiciones climáticas.

Youth: building stronger communities through Nutraceutical farming.

Juventud: construir comunidades más fuertes a través de la agricultura nutracéutica.

Dr. Ronald Blake,
Executive Director,
Jamaica 4H Clubs,
Jamaica

Recycling of citrus scrap into natural additives for food industries. LIFECITRUS Project.

Reciclado de subproductos de la industria de cítricos en aditivos naturales para la industria alimentaria. Proyecto LIFECITRUS.

Ana Belen Morales,
Agrofood Cluster,
Spain

Healthy properties of Brocoli.

Propiedades saludables del Brocoli.

Debora Villaño,
Catholic University of Murcia UCAM, Spain

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Closing Act: UCAM Presentation

Acto de Clausura: Presentación de la UCAM

Estrella Nuñez, Vice Dean of Research at UCAM

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Friday 26th January 2018. CTC/Molina de Segura
Meeting with CTC researchers and Agrofood Cluster.

CTC is a private non profit research organization working in food research including the valorisation of food wastes and by products, new natural ingredients from MAPS, etc. CTC is partner of the HERBS4YOUTH project

The main mission of **AGROFOOD Cluster** is to create value in cooperation to increase the competitiveness of the agri-food system

Visit to CTC facilities.

www.herbs4youth.eu

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ABSTRACTS

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List of communications:

1. COMPARATIVE ANALYSIS OF PRODUCTION AND MARKET OF MEDICINAL AND AROMATIC PLANTS IN COSTA RICA, JAMAICA AND BRAZIL. CURRENT SITUATION AND OPPORTUNITIES.

2. TRADE LEGAL ASSESSMENT FOR PLANTS FROM COSTA RICA, JAMAICA AND BRAZIL AS INGREDIENTS/ADDITIVES/FOOD/ SUPPLEMENTS ADDRESSED TO THE EUROPEAN MARKET.

3. HEALTHY PROPERTIES OF BROCCOLI. SPROUTSFIGHTFAT PROJECT

4. SCIENCE BEHIND HERB PRODUCTION: SCIENTIFIC BACKGROUND AND ECOPHYSIOLOGICAL ASPECTS TO BE CONSIDERED FOR THE PRODUCTION OF GOOD QUALITY HERBS (MAPs) UNDER DIFFERENT CLIMATIC CONDITIONS

5. HERBS4YOUTH PROJECT IN COSTA RICA

6. YOUTH BUILDING STRONGER COMMUNITIES THROUGH NUTRACEUTICAL FARMING

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8. ANTIOXIDANT AND ANTIMICROBIAL CAPACITY OF NATURAL EXTRACTS OF FRUITS AND LEAVES FROM THE REGION OF MURCIA

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9. USE OF RAW MATERIALS SURPLUS FOR THE PREPARATION OF RESTRUCTURED FOODS

10. RECOVERY OF INTEREST COMPOUNDS FROM THE PROCESS WATERS OF CITRUS INDUSTRIES

11. BEST INNOVATIVE APPROACH TO MINIMIZE POST HARVEST LOSSES WITHIN FOOD CHAIN FOR VET, POSTHARVEST

12. ECO- INNOVATION SKILLS FOR EUROPEAN DESIGNERS – ECOSIGN.

13. AFTERLIFE PROJECT: AN INTEGRATED SOLUTION FOR THE RECOVERY AND CONVERSION OF RELEVANT FRACTIONS FROM WASTEWATER

14. VALIDATION OF ADSORBENT MATERIALS AND ADVANCED OXIDATION TECHNIQUES TO REMOVE EMERGING POLLUTANTS IN TREATED WASTEWATER – LIFE CLEAN UP

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1. COMPARATIVE ANALYSIS OF PRODUCTION AND MARKET OF MEDICINAL AND AROMATIC PLANTS IN COSTA RICA, JAMAICA AND BRAZIL. CURRENT SITUATION AND OPPORTUNITIES.

Eva Moré Palos

Aromatic and medicinal plants group. Bioeconomy and Governance. Forest Science and Technology Centre of Catalonia (CTFC), Solsona, Catalonia (Spain), E-mail: eva.more@ctfc.cat, URL: http://www.ctfc.cat.

SUMMARY

In order to provide significant information about the partner's countries of the project Erasmus+ Herbs for Youth, a comparative analyses of the medicinal and aromatic plants (MAPs) situation in Brazil, Costa Rica and Jamaica was implemented in 2016. The methodology consisted firstly in describing the socioeconomic features and developing strategies of the involved countries. Secondly, listing in the local MAPs species used by the society and deepening in which ones are currently cultivated and marketed. Furthermore, an overview of the existing organisations dealing with MAPs and/or rural development has been made. Finally, a SWOT analyses has been elaborated for each country regarding economy, wild collection, cultivation, traditional uses and trade of MAPs, and common conclusions evaluated.

In order to adjust to the specificities, the country analyses in Brazil has been focused Alaogas State, in the Northeast region. Alagoas State has an area of 27.767 km2 and a population density around 110 people/km2, while the Caribbean island of Jamaica is 10.991 km2 and has 248 people/km2 and the Central American Costa Rica 51.032 km2 and 89 people/km2. The share of Gross Domestic Product (GPD) in Agriculture is 7,3% in Alagoas, 7,2% in Costa Rica and 5,6% in Jamaica, being more important the services (tourism). They share some crops like sugar cane, coffee and bananas, producing other products like tobacco, cotton and eucalyptus in

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Alagoas, and cocoa, citrus and allspice in Jamaica. All countries are exporters of *Piper* and *Capsicum* spices, and other medicinal plants.

They share common species like *Cymbopogon citratus, Eryngium foetidum, Smilax sp., Mentha sp., Justicia pectoralis, Lippia alba, Zingiber officinale*, etc. that are interesting herbs. Most of the species still come from the wild, and most demanded ones are being studied for initiating programmes of domestication. The quality of the raw material is still very low, due to lack of training of producers and lack of marketing structures among producers, as the majority of the producers are small farmers.

Each country has specific features regarding their development strategies in relation to MAPs:

- ✓ Jamaica has an agricultural plan for enhancing exports of herbs and spices.
- ✓ Alagoas (Brazil) has an agricultural plan for promoting local medicinal plants: local cultivation for improve health of local populations.
- ✓ Costa Rica is addressing to the valorization of local flora for pharmaceuticals and also to enhance ecotourism. Producers are focusing to elaborated products.

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2. TRADE LEGAL ASSESSMENT FOR PLANTS FROM COSTA RICA, JAMAICA AND BRAZIL AS INGREDIENTS/ADDITIVES/FOOD/ SUPPLEMENTS ADDRESSED TO THE EUROPEAN MARKET.

VALORACIÓN LEGAL PARA LA COMERCIALIZACIÓN DE PLANTAS DE COSTA RICA, JAMAICA Y BRASIL COMO INGREDIENTES/ADITIVOS/ALIMENTOS/ COMPLEMENTOS EN EL MERCADO EUROPEO.

Astrid van Ginkel

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SUMARIO (SUMMARY)

El objetivo de esta comunicación es evaluar, desde el punto de vista de la normativa legal, las opciones de comercialización de algunas plantas de Costa Rica, Jamaica y Brasil interesantes con la intención de ser introducidas en el mercado europeo.

La comercialización de alimentos a base de plantas en Europa depende de la administración sanitaria de cada país ya que no se ha conseguido una armonización de los estados miembros en esta materia. En España las plantas alimenticias pueden formar parte de diferentes tipos de productos que disponen de una normativa específica. Así pues, se pueden clasificar como té, infusiones de uso en alimentación, especias y condimentos o complementos alimenticios. Cuando una planta no se halla en la lista de las especias o de las infusiones, puede comercializarse como complemento alimenticio a través del reconocimiento mutuo gracias a su presencia en alguna de las listas de plantas permitidas en alimentación existentes en otros países de Europa. Cuando una planta no se halla en ninguna lista y no hay indicios de comercialización en Europa previos a 1997 se puede intentar la vía del Novel Food.

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La metodología utilizada ha sido listar las principales especies de interés potencial de los tres países y la parte utilizada. Para elaborar la lista se han utilizado los materiales de formación elaborados para el Proyecto Europeo *ERASMUS+ Herbs4Youth* que se hayan disponibles en la página web http://www.herbs4youth.eu. Concretamente, el "Herb Atlas", el "Libro de estudio" y el "Análisis comparativo de la situación del mercado" de los 3 países. Posteriormente, planta por planta, se comprueba su presencia o ausencia en las principales listas de plantas permitidas en alimentación, en concreto de Bélgica, Italia, Belfrit (recopilación de Bélgica, Francia e Italia), y otros países, así como, el catálogo de Novel Food. Si no está presente en ninguna lista, se consulta la web "The Plant list", para conocer sinónimos y buscar estos en las listas.

Las 15 plantas que forman parte del Herb Atlas son *Aloe vera*, *Baccharis trimera*, *Costus spicatus*, *Cymbopogon citratus*, *Hibiscus sabdariffa*, *Justicia pectoralis*, *Lippia alba*, *Maytenus aquifolium/Maytenus ilicifolia*, *Matricaria recutita (Chamomilla recutita)*, *Momordica charantia*, *Morinda citrifolia*, *Ocimum basilicum*, *Petiveria alliacea*, *Psidium guajava* y *Zingiber officinale*.

Todas están presentes en alguna lista excepto 3. Concretamente *Costus spicatus*, *Maytenus aquifolium/Maytenus ilicifolia* y *Lippia alba*. Si una planta no se halla en una lista ni está aprobada como Novel Food no se puede comercializar para formar parte de un alimento. Es el momento de presentar un dosier como Novel Food o de explorar otras vías, es decir, cosmético, medicamento, fertilizante, fitosanitario, etc.

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3. HEALTHY PROPERTIES OF BROCCOLI. SPROUTSFIGHTFAT PROJECT

PROPIEDADES SALUDABLES DEL BRÓCOLI. PROYECTO SPROUTSFIGHTFAT

Débora Villaño Valencia

Dra. Débora Villaño Valencia. Nutrition, Oxidative Stress and Bioavailability Research Group. Catholic University of Murcia (UCAM), Guadalupe, Murcia, Spain. dvillano@ ucam.edu. URL: http://investigacion.ucam.edu/grupos/nutricion-estres-oxidativo-y-biodisponibilidad

SUMMARY

Nowadays there is an increasing demand by consumers on healthy food products in convenient forms, simple to use and natural, not containing additives. Broccoli sprouts (*Brassica Oleracea L. Var. Italica*) represent an interesting choice as they are rich in bioactive compounds as glucosinolates and their hydrolysis products, the isothiocyanates, which have proven beneficial properties against a range of diseases in both epidemiological and *in vivo* human studies. As obesity is linked to an inflammatory component, the aim of the project is to evaluate the anti-inflammatory action of broccoli sprouts in overweight adult subjects.

We have performed an *in vivo* controlled nutritional study with 40 healthy overweight subjects. Treatment phase consisted on the consumption of broccoli sprouts (30 g/day) during 10 weeks and the follow-up phase of 10 weeks of normal diet without consumption of these broccoli sprouts.

We measured anthropometric parameters as body fat mass, body weight, and BMI and we have collected data about their dietary habits and exercise. The inflammatory status was assessed by measuring plasma concentrations of TNF-α, IL-6, IL-1β, and C-reactive protein (CRP).

IL-6 levels significantly decreased (mean values from 4.76 pg/mL to 2.11 pg/mL, $p<0.001$) after 70-days of consumption of broccoli sprouts and during control phase the

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inflammatory levels were maintained at low grade (mean values from 1.20 pg/mL to 2.66 pg/mL, $p < 0.001$). C-reactive protein significantly decreased as well.

The consumption of broccoli sprouts is able to affect IL-6 and C-reactive protein levels in overweight subjects, hence attenuating chronic inflammation. This study represents an advance in intervention studies as we included the broccoli sprouts in dietary portions, in a daily dietary pattern in quantities that reflect a real consumption, avoiding the use of very high dosages. Higher changes on inflammation parameters may need longer periods of intake. Further studies are necessary to elucidate the role of this healthy rich and nutritious food product, but these promising results support the current evidence on the healthy properties of *Brassica* varieties.

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4. SCIENCE BEHIND HERB PRODUCTION: SCIENTIFIC BACKGROUND AND ECOPHYSIOLOGICAL ASPECTS TO BE CONSIDERED FOR THE PRODUCTION OF GOOD QUALITY HERBS (MAPs) UNDER DIFFERENT CLIMATIC CONDITIONS

LA CIENCIA TRAS LA PRODUCCIÓN DE HIERBAS: ANTECEDENTES CIENTÍFICOS Y ASPECTOS ECOFISIOLÓGICOS A CONSIDERAR PARA LA PRODUCCIÓN DE HIERBAS DE BUENA CALIDAD (MAP) BAJO DIFERENTES CONDICIONES CLIMÁTICAS.

Ákos Máthé

Prof. Dr. Ákos Máthé, No-Gravity, Bratislava Chair of ESCORENA NETWORK, Hungary.

SUMMARY

The use of herbs dates back to the beginnings of mankind. “Mother Nature” has always been a rich source of biologically active natural substances that could be used for various purposes. In a parallel way with the evolution of Homo sapiens, the former drug used in traditional medicine have become raw materials for the pharmaceutical industry and medical and aromatic plants (MAPs) have become important sources for the healthy nutrition and welfare of the “modern man” (they provide food, spices and feed, raw material for the cosmetic industry, aromatherapy, etc. all over the world). A farther important aspect of dealing with herbs is that they provide livelihoods for local populations.

As the Herbs4Youth project is aimed at increasing/improving capacities of the partners by education and training, it seems justifiable to take a closer look at herbs (MAPs) from the scientific perspective.

As such, firstly, we would like to focus on the biologically active principles of MAPs, a special feature that makes them suitable to serve a wide variety of products (e.g.: plant extracts, traditional herbal medicines, pharmaceuticals, homeopathic, medicinal and herbal teas, dietary

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supplements, spices and culinary herbs, fragrances and perfumes, cosmetics and body care, food and beverage, food ingredients, aromas and essences, coloring/dye agents, etc.).

Secondary principles (substances) are synthesized by the green plant using the energy obtained from the sun and utilizing, in this process, the various factors offered by the physical and biological environment. Although this process is strongly related to the photosynthesis, the basis of life on earth, most of the biologically active principles are produced in the intrinsic chemical processes of the secondary metabolism of plants using intermediaries originating from the Calvin-cycle.

All of these processes are regulated by the genetic setup of plants and are under the control of the environment. In view of the diversity of nature, it can be postulated that the end-product of these processes, i.e. the active principles, are variable, in both qualitative and quantitative aspects.

It is the task of the farmers to elaborate/use tools and technologies to help plants best use the conditions offered by their environment, in an eco-physiological approach. All measures applied by the growers (from propagation through plant care to harvest) should be governed by these principles. This, complex, process that ends up in plant harvest and subsequent primary processing, is assisted by the results of several sciences (from genetics, through plant physiology, to post harvest physiology).

Optimally, the final product, the crude drug (herbs that we use) should be produced in large quantities and good quality. Strict quality control and management procedures have been elaborated to assist the production and processing chain in arriving at MAPs raw materials to be used with **safety, efficacy and in good quality**. In this regard, the spread of organic production is also a means producing a special/good quality produce.

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With these thoughts in mind and building on the steady supply of scientific results, MAPs produced in either small or larger scales are likely to yield not only a pleasant and useful pastime, but create/contribute also to livelihoods, in certain parts of the world.

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5. HERBS4YOUTH PROJECT IN COSTA RICA

PROYECTO HERBS4YOUTH EN COSTA RICA

Daniel Jimenez Fallas

Director de Operaciones. Outward Bound Costa Rica. Costa Rica. E-mail: programdirector@outwardboundcr.org, URL: http://www.outwardboundcostarica.org.

SUMARIO (SUMMARY)

El programa de Hierbas para los jóvenes en Costa Rica se basó en 2 puntos:

- 1 Establecimiento de Huertos para hierbas aromáticas, medicinales y vegetales en Tres Ríos ,
- 2 en conjunto con el instituto nacional de aprendizaje (INA) investigación, comparación y intercambio de ideas.

Parte 1: después del proyecto en Tres Ríos el cual fue muy beneficioso ya que a partir de esa idea se agrando el huerto y se producen actualmente 400 lechugas, culantro, chiles dulces, brócoli espinacas etc., se trasladó las ideas a las comunidades indígenas donde se construyeron 5 huertos para la comunidad, esto aportando a las comunidades la oportunidad de comer saludable y tener al alcance variedad de plantas, especies y vegetales disponibles para el consumo ya que no se disponía de estos para ellos.

Además, en la escuela local de Tres Ríos, se empezó un proyecto de huerto escolar para la población estudiantil de 140 niños y niñas de edades entre los 4 a 6años de edad, los mismos niños y maestros se encargaron de preparar, cultivar y cosechar las plantas, con un alcance de 150 lechugas al mes, los cuales se consumían en las meriendas diarias de los mismos.

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6. YOUTH BUILDING STRONGER COMMUNITIES THROUGH NUTRACEUTICAL FARMING

Ronald Blake

Dr. Ronald Blake, Executive Director, Jamaica 4-H Clubs, Jamaica.

SUMMARY

The Global Nutraceutical Industry is estimated to be growing at a compound annual rate of eight per cent (8%) with expected earnings of US $424 billion by 2017 *(Jamaica Promotions, [JAMPRO], 2015*). In order to reposition the Jamaican economy to provide jobs, wealth and generally a better quality of life within rural communities, the integration of sustainable industries such as nutraceuticals becomes necessary. Jamaica has a natural advantage as a primary producer of food sources that provide health benefits and have basic nutritional value. Of the 160 plants declared to have medicinal properties worldwide, 84 are endemic to Jamaica. Therefore, the move towards commercial production of these plants is pivotal to the creation of rural employment, cottage and medium size industries within these rural communities.

The high level of youth unemployment in Jamaica can be fully absorbed in this emerging industry. It holds the capacity to embed youth creative energy in a culture of scientific innovation and application within the Nutraceutical Industry. Already the gains from the growing of nutraceutical plants are much more attractive than plants grown solely for food. This provides a necessary attraction for youth, many of whom are formally trained in Agriculture. The Jamaica 4-H Clubs has entered into a formal partnership with the National Council on Science and Technology, (NCST), Scientific Research Council, (SRC) and the University of the West Indies, (UWI), to train 1000 youth to function at various levels within the nutraceutical value chain.

The imperatives for the local industry must include; capacity building, resource facilitation especially for research and commercialization, product awareness and timely

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completion of the legislative requirements. The industry has a bright future. The combination of the use of natural plant remedies, which is a Jamaican cultural tradition, and the manufacturing of pharmaceuticals through the Nutraceuticals industry, will provide significant contributions to our country and the world's people.

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7. RECYCLING OF CITRUS INDUSTRY SCRAP INTO NATURAL ADDITIVES FOR FOOD INDUSTRIES. LIFECITRUS.

Project with the contribution of the LIFE financial instrument of the EU (LIFE14 ENV/ES/000326)

Ana Belén Morales Moreno

Fundación Clúster Agroalimentario de la Región de Murcia, AGROFOOD, Molina de Segura, Murcia (Spain). ana.morales@agrofoodmurcia.com; www.agrofoodmurcia.com.

SUMMARY

In Spain, about 1.5 million tons of citrus are used for industrial processing to extract about half the weight of the fruit as juice. The rest, skin, seeds and pulp become waste, which is an environmental problem. The project called "Recycling of the by-products of the citrus industry in natural additives for the food industry", known as LIFECITRUS, proposes the implementation of an innovative process for the valorization of these residues (or by-products) by obtaining a natural ingredient.

The proposed process is based on physical operations without the use of solvents or any chemical agent, which requires minimal water consumption. The product is obtained like a mash product. This product can be used as an innovative natural ingredient, with exceptional properties, which can replace additives such as pectins in the production of jams and other food products (vegetable purees, sauces, ice creams, etc.). In addition, its characteristics allow the development of new foods without providing a high energy value, but with a high content of dietary fiber. Thus, it seeks to offer consumers a different product and classified as organic, with excellent sales prospects.

Therefore, it is important to transfer the knowledge of the project to the operators of the industry (citrus farmers, marketers and industries, associations and related public bodies) in order to allow the European citrus operators to apply the process and the technology proposed on an industrial scale.

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8. ANTIOXIDANT AND ANTIMICROBIAL CAPACITY OF NATURAL EXTRACTS OF FRUITS AND LEAVES FROM THE REGION OF MURCIA

Lorena Martínez – Gaspar Ros – Gema Nieto

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SUMMARY

The Region of Murcia is known to be the orchard of Europe, due to its climatic conditions and soils that have made possible the growth of a great variety of fruits and vegetables. In fact, Murcia exports to the rest of Europe a large part of the fruits, vegetables, its preserves, juices and olive. In contrast, a problem of juice and canning industry is the amount of waste generated from skins, seeds and leaves, which besides being a problem for the environment, they were a waste of money for companies. However, these parts of the fruits are really rich on phenolic compounds that can be extracted and used by pharmacological or food industry, due to the beneficial effect of their consumption.

In this work it has been measured the antimicrobial and antioxidant capacity of several extracts from rosemary (there are 3500 ha of aromatic plants cultivated in Murcia, and the most common is rosemary), grape seed (obtained from wine production, that it was 23000 tons the past 2016), pomegranate (282 ha and its production increases each year) and hydroxytyrosol (from olive oil production, that it was 63557 tons the past 2016). Consequently, it has been showed that these extracts have antimicrobial capacity against gram negative (*Lysteria Monocytogenes* and *Staphilococcus Aureus*) and gram-positive bacteria (*E. Coli*). Hydroxytyrosol was the most powerful extract followed by rosemary, pomegranate and grape seed. Nevertheless, the most antioxidant extract and with the highest content of phenol compounds was pomegranate, followed by hydroxytyrosol, grape seed and rosemary. In view of the fact that the consumption

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of phenolic compounds is beneficial to the human body, it can be concluded that these extracts could be used in food industry to replace synthetics additives or in pharmaceutical industry to avoid diseases.

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9. USE OF RAW MATERIALS SURPLUS FOR THE PREPARATION OF RESTRUCTURED FOODS
APROVECHAMIENTO DE EXCEDENTES DE MATERIA PRIMA PARA LA ELABORACIÓN DE ALIMENTOS REESTRUCTURADOS

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SUMARIO (SUMMARY)

Las empresas procesadoras de alimentos generan excedentes de producción por diversos motivos que deben eliminar, con la consiguiente pérdida que genera el gasto en materia prima, energía y gestión medioambiental.

Una solución a estos excedentes de producción, como pueden ser los purés de frutas y vegetales, pueden revalorizarse mediante la extracción de los compuestos de interés para la nutrición humana, vitaminas, fibra,… para su utilización como ingredientes o para la fabricación de alimentos estructurados.

El objetivo del proyecto es la aplicación de técnicas de purificación y extracción, procesos fermentativos, enzimáticos, concentración, clarificación, etc., para la obtención de productos con compuestos de interés biológico con los que el CTC está desarrollando alimentos reestructurados vegetales y de frutas para su utilización como ingredientes en la elaboración de pasteles, helados y platos preparados. En la actualidad con los subproductos de la industria del tomate y la pera se han elaborado distintos alimentos reestructurados.

Las actividades realizadas dentro de este proyecto han sido:

- Aplicación de técnicas para la obtención de productos con compuestos de interés biológico para desarrollar productos reestructurados vegetales para su utilización como ingredientes en la elaboración de alimentos

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- Selección de los subproductos del sector agroalimentario de interés para su revalorización con propiedades nutricionales interesantes para la alimentación humana.
- Desarrollo de tecnologías para la revalorización de los subproductos seleccionados.
- Validación de los productos obtenidos mediante su aplicación en el desarrollo de alimentos
- Las distintas actividades realizadas dentro del proyecto permiten concluir que la • La pera reestructurada obtenida presenta buen sabor, color y textura. y es resistente a temperaturas de horneado., ofreciéndose como una alternativa al uso de pera fresca.
- Los productos obtenidos a base de tomate son ricos en vitamina e, licopeno, compuestos fenólicos y fibra, siendo muy bien valorados a nivel sensorial.

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10. RECOVERY OF INTEREST COMPOUNDS FROM THE PROCESS WATERS OF CITRUS INDUSTRIES
RECUPERACION DE COMPUESTOS DE INTERES DE LAS AGUAS DE PROCESO DE LAS INDUSTRIAS CITRICAS

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SUMARIO (SUMMARY)

La Región de Murcia es una importante productora de cítricos. Principalmente son una fuente primaria de nuestros requerimientos diarios de vitamina C, y este el origen de la usual incorporación a la dieta de los países desarrollados, unida a una dosis suplementaria de gran valor nutritivo y funcional por su contenido en aminoácidos, elementos minerales, bioflavonoides de elevado valor biológico. Los flavonoides son compuestos polifenólicos que se encuentran repartidos en las diferentes partes del fruto y en mayor cantidad en la corteza, en forma de glucósidos con moléculas de azúcares; tienen un elevado valor biológico. Parte de estos compuestos se pierden en las aguas que se utilizan en distintas etapas del procesado de los cítricos. Con este proyecto el CTC pretende desarrollar una tecnología susceptible de recuperar todos los compuestos con valor biológico en las aguas de proceso de las industrias cítricas.

Las actividades desarrolladas dentro de este proyecto han permitido la definición de las distintas fuentes de subproductos de la industria procesadora de limón. En la planta piloto del CTC se han caracterizado las aguas de lavado que se obtienen en el procesado industrial del procesado de la corteza de limón y se observaron concentraciones elevadas de hesperidina, para la recuperación de este compuesto se ha realizado una extracción en medio básico y posterior precipitación en medio ácido. El precipitado es recuperado mediante centrifugación, obteniendo

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por un lado un concentrado rico en hesperidina y un agua con bajos contenidos en carga orgánica apta para su reutilización en el proceso.

Con los resultados obtenidos se concluye que existe una pérdida de compuestos saludables en las distintas corrientes de subproductos en las industrias cítricas. Es necesario la optimización de los procesos de recuperación de estas corrientes y extracción de compuestos de interés, para que sean viables tecnológica y económicamente a nivel industrial.

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11. BEST INNOVATIVE APPROACH TO MINIMIZE POST HARVEST LOSSES WITHIN FOOD CHAIN FOR VET, POSTHARVEST.

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SUMARIO (SUMMARY)

Agricultural commodities produced on the farm fields have to undergo a series of operations such as harvesting, threshing, winnowing, bagging, transportation, storage and processing before they reach the consumer, and there are appreciable losses in crop output at all these stages.

Losses during and after the harvest result in major problems in marketing. Improper harvest and post-harvest practice result in losses due to spoiling of the product before reaching the market, as well as quality losses such as deterioration in appearance, taste and nutritional value.

The rate of loss in fresh fruits and vegetables varies between 5% and 25% in developed countries, 20% and 50% in developing countries according to products structure and processing patterns.

The purpose of the Project is to monitor and examine harvest and the post-harvest losses of fruits, which is the most major problem in the food and agriculture sector, these losses directly affect actual prices,

In scope of POSTHARVEST, four different fruits with high export and economic value for Turkey are selected. Fig, grape, tomato, cherry are four significant fruits for Turkish domestic market because of their common use.

Advanced techniques and alternatives in fig, grape, tomato, cherry harvest and marketing were not known by the farmers in the area. The farmers were not aware of the benefits of alternative techniques.

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Even if they were in need of making changes in marketing, they were not informed and equipped about how they could do it. After an efficient training program, effects of experience, educational level and their annual income could be more apparent.

In the scope of the Project multifaceted and comprehensive training programs about harvest and post-harvest operations will be made. At the same time, practical applications will be made together with producers in pilot areas selected. Producers will be made aware of different and efficient harvest, packaging, storage, transportation, marketing systems. Meetings with producers from different areas will be organized and exchanging of their experiences could be facilitated.

Target groups are growers, shippers, marketers, carriers, distributors, retailers, processors, and consumers of these crops.

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12. ECO- INNOVATION SKILLS FOR EUROPEAN DESIGNERS – ECOSIGN.

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SUMARIO (SUMMARY)

The ECOSIGN project has created an Eco-Innovation Skills Alliance in four European countries (Slovenia, Spain, Romania and Italy) with the aim of addressing the lack of knowledge of designers coming from three economic sectors - food packaging, electronic goods and clothing/textile - in Eco-design (design for the environment: is the integration of environmental considerations in product development).

Eco-designers for food packaging help clients meet marketing needs by creating attractive packaging for products using creative software and sketches. Strong interpersonal skills are often necessary, because package designers work with accountants and business professionals to create cost-effective packaging that meets consumer demands. They may also work with copywriters, marketing experts and other designers to ensure that packaging meets branding requirements and suits target audiences. Package designers may work as inhouse designers for design firms or perform work on a freelance basis.

Eco-designers for food packaging begin the design process by meeting with clients to develop an understanding of their packaging needs. They then assess consumer tastes, market trends and product details to conceptualize package designs. Together, clients and designers determine how to meet goals pertaining to cost, safety and branding. Package designers may spend time conducting additional research and meeting with suppliers or consumer groups to develop ideas.

Next, package designers illustrate their ideas. They may use hand-drawn sketches or design software to create digital drafts. After they've developed and edited a design, package designers

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again meet with clients to gather additional feedback. The process of re-designing continues until the designer and client are satisfied with the design.

Food Package designers must then create a prototype that can be analysed by clients and management. They work with engineers, consumer safety groups and accountants to ensure that their prototype is safe and cost effective. If standards are not met, re-designs may be required. When a product design gets final approval, it goes into production.

ECOSIGN project will end on 31 October 2018 with the main result to create a new joint curriculum and a training course for European Eco Designers that will add skills and competences to the designers regarding environmental technologies.

www.ecosignproject.eu

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13. AFTERLIFE PROJECT: AN INTEGRATED SOLUTION FOR THE RECOVERY AND CONVERSION OF RELEVANT FRACTIONS FROM WASTEWATER.
H2020-BBI-JTI-2016.

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SUMARIO (SUMMARY)

This project has received funding from the Bio Based Industries Joint Undertaking under the European Union's Horizon 2020 research and innovation programme under agreement No 745737.

AFTERLIFE (Advanced Filtration Technologies for the Recovery and Later conversion of relevant Fractions from wastewater) is a European collaborative project framed on the Bio-based Industries (BBI) call. 15 partners from 7 European countries (Belgium, Germany, Finland, Croatia, Italy, Spain and Portugal) participate in this initiative.

AFTERLIFE proposes a flexible, cost- and resource-efficient process framed in the zero- and circular economy approach for the recovery and valorisation of the relevant fractions from wastewater. The first step of such process is an initial step consisting of a cascade of membrane filtration units for the separation of the totally of solids in wastewater. Then, the concentrates recovered in each unit will be treated to obtain high-pure extracts and metabolites or, alternatively, to be converted into value-added biopolymers (polyhydroxyalkanoates). Moreover, the outflow of the process is an ultra-pure water stream that can be directly reused.

AFTERLIFE means a significant improvement even over the best treatment technologies in line. The main advantages are:

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(a) complete recovery of the suspended and soluble matter,

(b) concentration of the nutrients resulting in a reduction of the working volume (up to 75%),

(c) higher flexibility for an application in different industrial processes

(d) possibility to obtain a wide range of products from high value-added metabolites and extracts to value-added biopolymers, maximising the cost-effectiveness of the process.

Food and beverage processing has been selected for the validation of the process since it is a very water intensive sector, which is ranked as the third European industrial manufacturing sector with the largest water consumption. Such industry consumes about 4.9 m3/inhabitant-year of water and generates a similar wastewater volume, that is, about 3,700 Million m3/year, treated in-situ and/or in municipal wastewater treatment plants. Moreover, the presence of a large variety of natural extracts from food processing converts the effluents into a very attractive source of value-added additives that have not been extensively valorised up to now.

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14. VALIDATION OF ADSORBENT MATERIALS AND ADVANCED OXIDATION TECHNIQUES TO REMOVE EMERGING POLLUTANTS IN TREATED WASTEWATER – LIFE CLEAN UP. (LIFE16/EN/ES/000169).

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SUMARIO (SUMMARY)

New and emerging pollutants (EPs) are synthetic or naturally occurring chemicals that are known or suspected of causing negative impacts on human health and the environment, but not all of them are yet commonly monitored; for example, they are not listed as pollutants by the Environmental Quality Standards Directive or Priority Substances Directive.

The major source of EPs is urban wastewater, as well as the effluents of the Waste Water Treatment Plants (WWTPs) of hospitals, agriculture and industry.

Current WWTPs are not designed for the treatment and removal of EPs, resulting in them being discharged into the environment. Furthermore, many of them are known or suspected of being bioaccumulative and having a biomagnification character, increasing the risks of them entering aquatic and land ecosystems as well as drinking water sources.

LIFE CLEAN UP aims to validate an innovative, efficient and environmentally friendly system to remove EPs and other pathogens from wastewater. The solution consists of an adsorption system coupled with an advanced oxidation technology.

Different polymers, including cyclodextrins and hydrogels and biomaterials from agriculture, will be tested in order to devise an optimised adsorption system, which aims to retain a high concentration of different families of EPs. On its way out of the adsorption system, the project will test the treating of the water with an advanced oxidation process (AOP) involving light

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pulses, photocatalysis and photosensitisers to degrade pollutants and pathogens that were not previously retained.

The project will demonstrate a system that integrates the proposed technologies – retention by adsorbent materials and destruction by AOPs – in a working WTTP on a semi-industrial scale, validating the process by comparing laboratory and plant results. This system will be fed by renewable energy and will not generate waste (as the materials will be re-usable).

To support its ultimate aim of reducing negative impacts on ecosystems and human health, the project will produce guidance to support take up of the system by WWTPs on an industrial scale. By removing pollutants that are not targeted by current water management systems in this way, the project aims to directly contribute to the implementation of European Directives on priority substances in the field of water policy as well as to the Water Framework Directive.

Expected results are:

- Validation, including economic and environmental feasibility, of a semi-industrial prototype of a depuration system that retains more than 90% of the EPs through adsorbent materials;
- Near total (98%) degradation by AOPs of adsorbed EPs and residual EPs still present in treated wastewater at the end of the process;
- An energy self-sufficient system using photovoltaic panels (8 700 kWh/year);
- Treatment capacity of the prototype at semi-industrial scale of 5 m3/h, treating around 43 000 m3/year or 14% of the wastewater treated in a WWTP for a small population (around 4 600 inhabitants);
- Demonstration of the feasibility of the system as well as its compatibility with current wastewater depuration systems and high transferability potential at industrial scale covering all the volumes treated in a WWTP; and

- Support for take up of the technology by producing guidelines for different adsorbent materials of EPs, working protocols and operational criteria about light pulses, photocatalysis and photosensitisers to eliminate organic pollutants, a cost-benefit analysis, a market study, a business plan and an exploitation plan of the proposed system.

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