Centro Tecnológico
Nacional de la Conserva
y Alimentación

METRO FOOD·RO

CTNC Spain, a long trip with agrofood companies.

14th November 2023, Bucharest, Romania

Centro Tecnológico Nacional de la Conserva y Alimentación

METRO FOOD·RO

National Technological Centre for Food and Canning Industry CTNC

Murcia, Spain

1962-1968

1968-1997

1997……

Founded in 1962 by a group of companies in collaboration with researchers of the University of Murcia.

CTNC is a **private non profit research organization** with more than 120 associated companies and working for more than 500 companies every year.

CTNC is recognized by the Spanish Government as Innovation and Technological Centre, Office of Transfer of Research Results and it is declared of Public Use.

Key figures

Turnover: 1.9 M€

Employees: 45

Market: PRIVATE NON PROFIT RESEARCH ASSOCIATION OF COMPANIES

Products: INNOVATION, APPLIED RESEARCH, DISSEMINATION, ETC.

www.ctnc.es

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METRO FOOD·RO

1. Why in Murcia?
2. Objectives
3. Involvement of companies
4. Expertise
5. Agro2Circular project
6. Agromatter project
7. Conclusions

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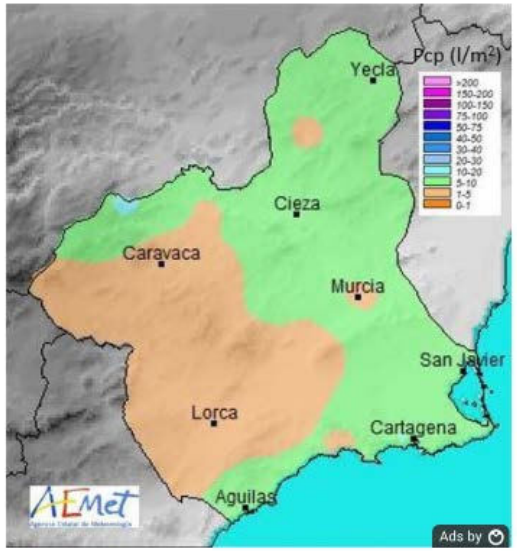
Why in Murcia?

METRO FOOD·RO



WHILE MURCIA REPRESENTS 2.2% OF SPAIN'S TERRITORY, WE ACCOUNT FOR 20% OF THE COUNTRY'S FRUIT AND VEGETABLE EXPORT REVENUE!

INVEST IN MURCIA SPAIN info

Region of Murcia's Share in National Exports

Product	
Lettuce	65.74
Cabbage	69.56
Pepper	13.4
Tomato	8.99
Celery	61.53
Other vegetables	9.25
Total vegetables	23%

Product	Percentage %
Lemon	55.76
Dessert Grapes	67.09
Melon	54.78
Peach	24.21
Watermelon	17.04
Other fruits	5.27
Total Fruits	17%

Total fruits and vegetables 20%

Source: Customs Records

Región de Murcia

Centro Tecnológico Nacional de la Conserva y Alimentación

METRO FOOD·RO

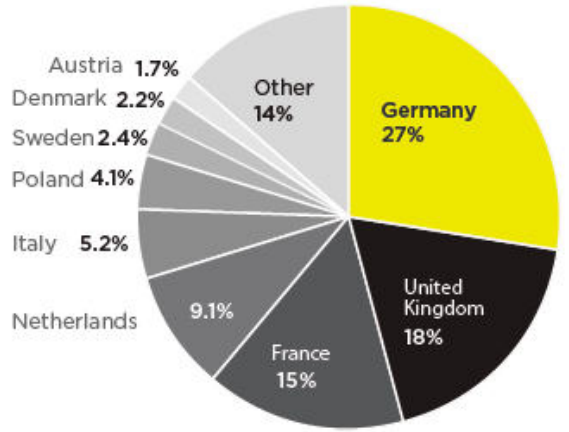
Why in Murcia?

INVEST IN MURCIA | SPAIN info

AGROFOOD SECTOR

The agrofood sector is the main exporter to Europe, representing 32.5% of employment and 28.3% of production in the region. Murcia is the Spanish region with the highest percentage of land devoted to organic farming and leads the production of 4th- and 5th-range food products.

Distribution of Export within EU Countries



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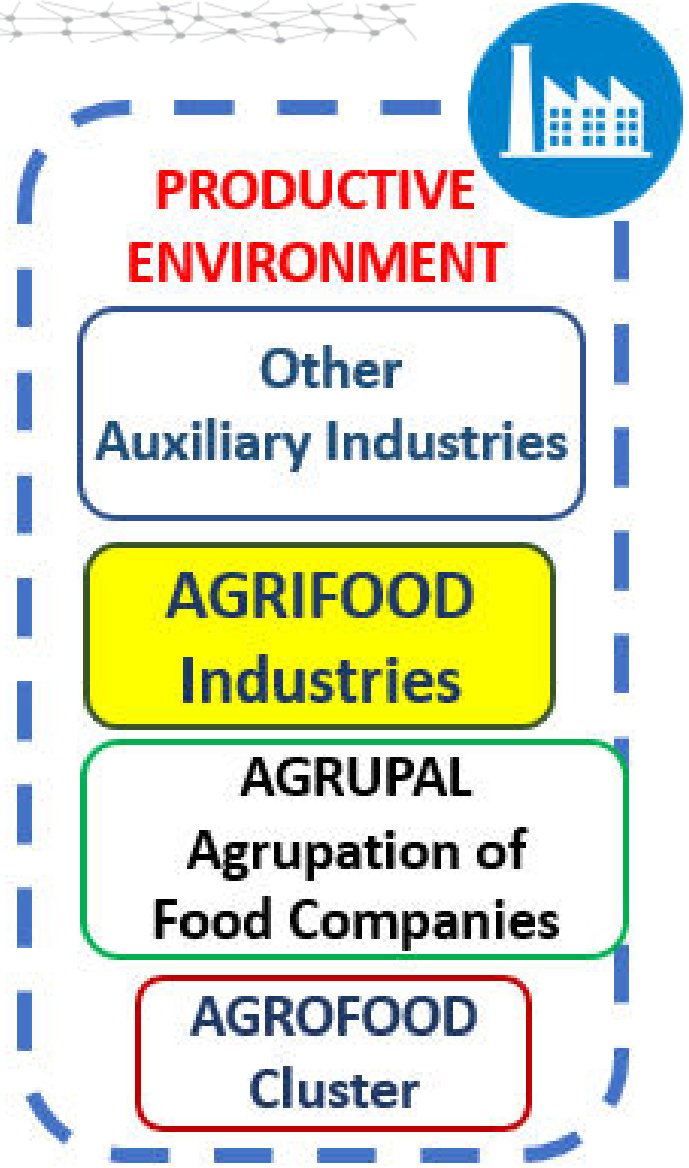
Why in Murcia?

STRONG PRODUCTIVE ENVIRONMENT

- 150 years sector (food sector is in the DNA of regional workers).
- Many agrofood companies.
- Strong auxiliary industries: agriculture, raw materials, containers, equipments, ingredients, etc.
- SMEs and big companies (tractor effect).
- Well connected companies: Competence is not in our region.

The stronger a company in the region is, the stronger the regional agri-food sector is.



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STRONG TECHNOLOGICAL ENVIRONMENT

- Automation and Robotics.
- 3D printing.
- Mild treatments: HP, MW, US, etc.
- Environmental impact.
- New sustainable containers.
- Valorization of secondary streams.

The stronger the technological actors are, the stronger the regional agri-food sector is.

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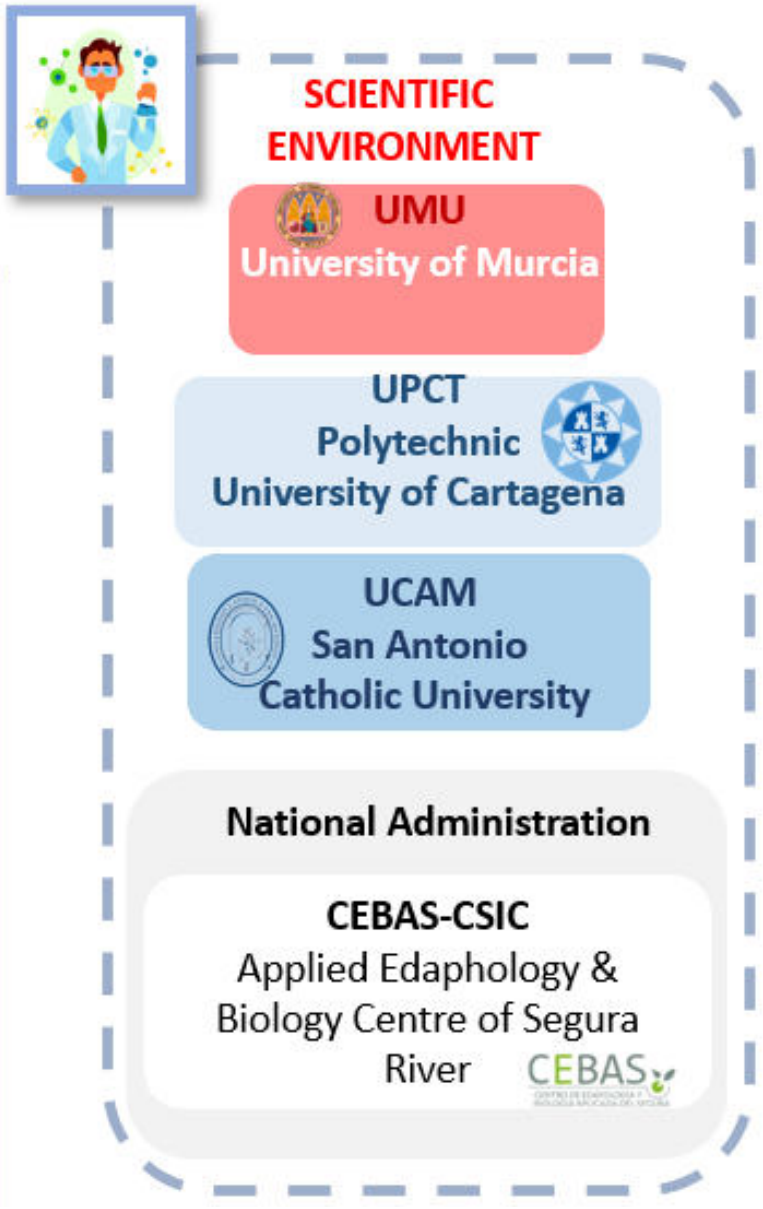
Why in Murcia?

STRONG SCIENTIFIC ENVIRONMENT

- Nutritional supplements, functional foods and beverages, gut microbiomes, etc.
- Plant based foods and beverages (meat and dairy substitutes).
- Ingredients that are natural, healthy and immunity boosters.
- New protein sources.
- Biodegradable materials, compostable packaging, and recyclable materials.

The stronger the scientific environment is, the stronger the regional agri-food sector is.



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Why in Murcia?

METRO FOOD-RO

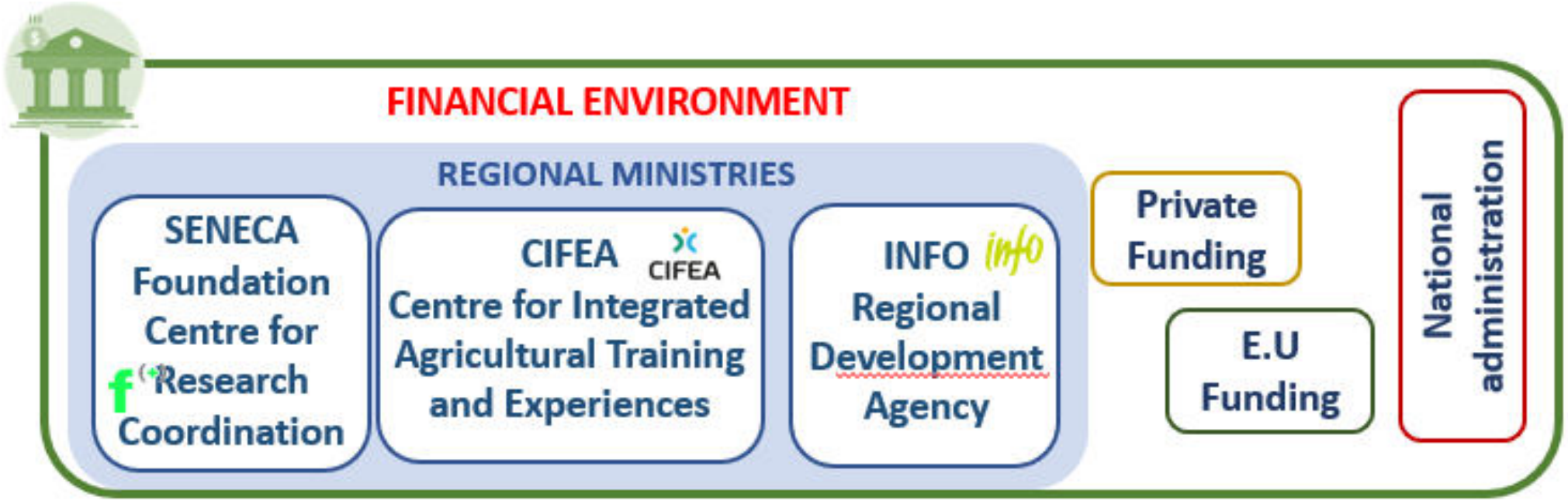
Some reasons why companies are discouraged from applying for finance:

Lack of mutual trust and understanding between bankers and companies, and lack of transparency in bank loan policy,

Negative previous experiences with banks,

Unattractive loan conditions as well as complicated and long application procedures,

Lack of financial literacy including capacity to develop quality business plans.



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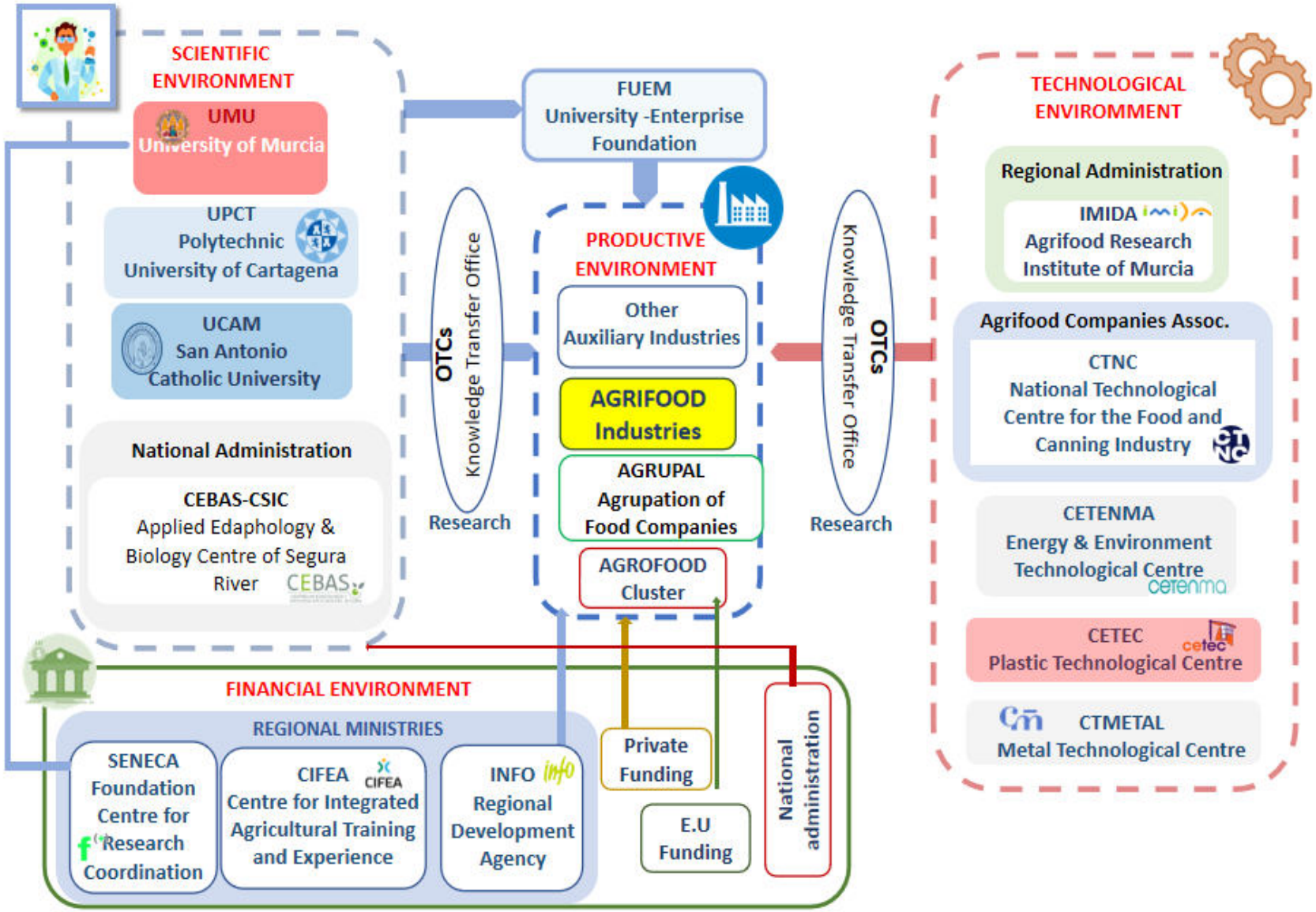
Why in Murcia?

METRO FOOD-RO

REGION OF MURCIA AGRO FOOD NETWORK

All environments involved in training



<u>Technological Centres</u>

Private non profit companies research associations.

Budget:

- Regional Administration for general interest research
- European and national projects
- Private projects and other activities

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Objectives

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CTNC's aim is to promote research, innovation and competitiveness in the agrofood sector.

- **Internationalization of the Agrofood sector: International projects and activities.**
- **SME consultancy activities.**
- **Analytical and technological services.**
- **Training at all levels.**
- **To make our industry more competitive.**
- **To solve environmental problems, introduction of new products and technologies, valorisation of by products, water reuse, etc.**
- **Technology transfer and dissemination activities**

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Involvement of companies

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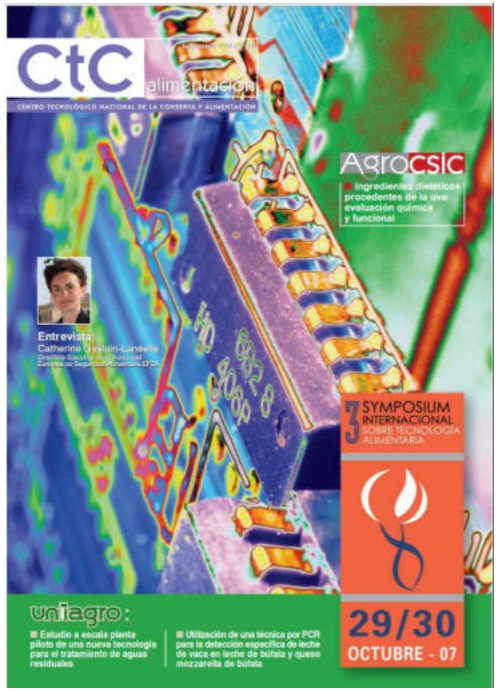

- CTNC's General Assembly and Governing Council are integrated only by companies.
- Companies are members of the Editorial Board of the magazine CTCAlimentacion (since 2001, number 79 December 2023)
- Since 2003 Technical Committee of CTNC's bianual International Symposium on Food Technology decides modules and topics.
- International Symposium is designed for companies.
- Innovation vouchers, projects, training actions, etc.

XI Simposium Internacional and Brokerage Event, 2023

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Involvement of companies

2007

Possibilities of valorisation of food industry by-products. CEBAS CSIC
Biomolecules recovered from fruit/beverage industry by-products. UASVM, Romania
The citric industry as a source for the production of bioetanol. FMC
Valorisation of water treatment sludges as biomass for energy production. SIGMA OKADORA
Sustainable energetic development in the processing of agroindustrial residues. FoodTech & Engineering Consulting

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Expertise

2007/2009

One aim of S.T.E.P. is to help companies in the food processing industry to integrate sustainable processing technologies in giving them tools to help in their decision to change. These tools have to be adapted to little and medium sized companies, because they have less resources than big companies and have almost to face the same environmental focus. They have to ensure that the company knows the impact of a future investment in terms of

- technological criteria
- economic criteria
- environmental criteria
- social criteria

The investment in sustainable processing technologies has to be seen as a factor of increasing the company's competitiveness.

STEP Sustainable Technology for Economic Procesing

- CCID - Chambre de Commerce et d'Industrie de la Drôme (Rhône-Alpes, Francia)
- CCIMP - Chambre de Commerce et d'Industrie Marseille Provence (Provenza-Alpes-Cote d'Azur, Francia)
- Euro Info Centre IT 351 - Azienda Speciale della Camera di Commercio di Milano (Lombardia, Italia)
- Euro Info Centre IT 361 Promofirenze - Azienda Speciale della Camera di Commercio Industria Artigianato di Firenze (Toscana, Italia)
- Chamber of Drama (Drama, Grecia)
- Chambre de Commerce et d'Industrie et de Services de Casablanca (Casablanca, Marruecos)
- CTC - Centro Tecnológico Nacional de la Conserva y Alimentación (Región de Murcia, España)

METRO FOOD-RO

2009/2011

DEVELOPMENT OF NEW ACTIVE CONTAINERS WITH NATURAL ADDITIVES FROM AGROFOOD WASTES (NATAL)

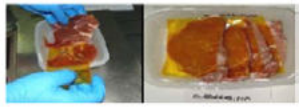
Spanish Ministry of Science

Natural additives from agroindustrial wastes that have been studied

Additives (active principle)	Action
Onion extracts (quercitina and other flavonoides)	Antioxidant and antimicrobial
Pepper extractcs	
Grape extracts (poliphenols)	
Alperujo extracts (poliphenols)	
Tomato skin extracts (lycopene)	Antioxidant
Alga extracts (ascorbic acid and tocoferol)	
Papaya extracts(papaina)	
Garlic extracts (organosulfurados)	Antimicrobial

Food and technology	Active container	Protection
Slices of cooked ham (soft pasteurisation)	Barrier and flexible packaging and separator film	Antimicrobial
Smoked salmon (refrigeration)		
Swordfish (sterilization)	Barrier and flexible packaging	
Slices of aged cheeses (refrigeration)		Antioxidant
Sliced cured Iberian pork meat (refrigeration and modified atmosphere)	Barrier and flexible packaging and separator film	
Fresh meat of Iberian pork (refrigeration and modified atmosphere)		Antioxidant and antimicrobial
Sliced cheeses (refrigeration)		
Fresh salmon (refrigeration)		
Sliced fruits and vegetables (refrigeration)	Barrier and flexible packaging	

Studied foods and containers

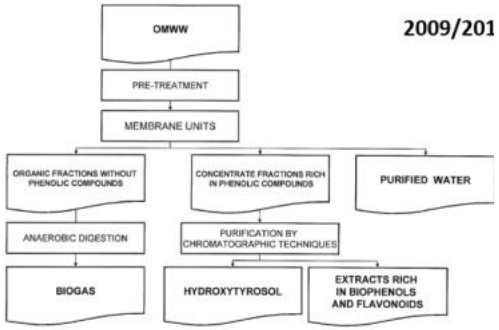


Re-waste

Recovery · Recycling · Resource

Valorization of olive mill effluents by recovering high added value bio-products

2009/201



LIFE + Environment Policy and Governance

Industria Olearia Biagio Mataluni srl

EuroImpresa consulenze & formazione

PST

CTC Centro Tecnológico Nacional de la Conserva

Biomasse et Emploi en milieu rural, BIOMEMPLOI, Leonardo

BiomEmploi

2011/2013

OBJECTIVES

- To identify challenges in terms of employment in the rural sector related with biomass in agriculture and forestry
- To define the skills / qualifications required for new jobs in biomass valorization.
- To set up a guide of skills for careers in the biomass sector
- To identify the role that communities can play to promote development of the sustainable resources management .
-To determine the restraints and success elements in the development of the sector.

AGRICULTEUR ➡ ENERGICULTEUR

CTC Centro Tecnológico Nacional de la Conserva y Alimentación

Programme d'éducation et de formation tout au long de la vie

DUE MONDI

AGRICULTURES & TERRITOIRES

ASSELDOR

Centro Tecnológico Nacional de la Conserva y Alimentación

METRO FOOD-RO

Expertise

Sustainable solutions in the agrofood sector

2010/2014

Sustainable strategies for integrated management of agroindustrial fruit and vegetable wastes (AGROWASTE) LIFE Programme of European Union
Reference: LIFE10 ENV/ES/000469. Coordinator: CEBAS-CSIC; Partners: CTNC and AGRUPAL

Artichoke, onion, garlic, tomato, lemon, orange, carrots, broccoli, peach, apricot, etc.

OBJECTIVE

The main objective of this project is to design an integrated management system for fruit and vegetable wastes (FVW) at the Region of Murcia (Spain), by using environmentally friendly technologies that will convert "residues" on "resource". The proposed technologies will be adapted to the specific type of residues and it will be integral managed, depending on the intrinsic FVW characteristics.

Main ways of Valorisation :

1. **Agriculture and Environment (composting)**
2. **Food (enriched extracts)**
3. **Energy (biomethanization)**

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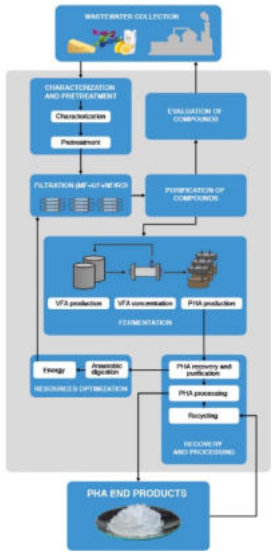
Expertise

Sustainable solutions in the agrofood sector

VALIDATION OF ADSORBENT MATERIALS AND ADVANCED OXIDATION TECHNIQUES TO REMOVE EMERGING POLLUTANTS IN TREATED WASTEWATER (LIFE CLEANUP) LIFE Programme of European Union
Reference: LIFE 16 ENV/ES/000169. 2017/2020
Coordinator: UCAM; Partners: Hidrogea, Regenera Levante, Hidrotec, CTNC (Spain), CNR-IPCF and Universidad de Bari (Italia).

WATER TECHNOLOGY INNOVATION ROADMAPS. Interreg Europe**.** 2018/2023
Index Number: PGI05062
Coordinator: Wetsus (NL); Partners: CREA Hydro&Energy, z.s. (CZ); Region of Crete (EL); Food and Agriculture Cluster Foundation of the Murcia Region (ES); Riga Technical University (RTU) (LV); Ministry of Education and Science of Republic of Latvia (MoES) (LV); Province of Fryslân (NL); University of Minho (Uminho) (PT); North-East Regional Development Agency (RO).

THE PROCESS



AN INTEGRATED SOLUTION FOR THE RECOVERY AND CONVERSION OF RELEVANT FRACTIONS FROM WASTEWATER (AFTERLIFE). Bio Based Industries (BBI-H2020). 2017/2021
Grant agreement No 745737
Coordinator: EggPlant; Partners: 14 partners from 7 European countries (Belgium, Germany, Finland, Croatia, Italy, Spain *(CTNC)* and Portugal).

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METRO FOOD-RO

Expertise

CTNC: main stakeholder in CE in the Regional agrofood sector

In 2018, within the Program of Aids of the **Regional Development Agency INFO** directed to Technological Centers of the Region of Murcia, co-financed by the European Regional Development Fund, the project of "Technological Surveillance to Support the R & D of the Agri-Food Sector" was carried out.
Many surveys were carried out to detect the R & D needs of the sector and to guide the CTNC in its new research lines. Among the detected needs are:

- Research in the valorization of by-products or food waste: obtaining dehydrated extracts, antioxidants and natural antimicrobials.
- Water management and recovery of wastewater through new bioprocesses: bioplastics, microalgae, etc.

info REGIÓN DE MURCIA

Una manera de hacer Europa
Fondo Europeo de Desarrollo Regional

Región de Murcia

Unión Europea

RESOLUCIÓN GENERAL DE CONCESIÓN DE SOLICITUDES DE AYUDAS INTEGRADAS EN EL PROGRAMA DE AYUDAS DIRIGIDAS A CENTROS TECNOLÓGICOS DE LA REGIÓN DE MURCIA DESTINADAS A LA REALIZACIÓN DE ACTIVIDADES I+D DE CARÁCTER NO ECONÓMICO. MODALIDAD 2: "PROGRAMA DE ACTUACIONES NO ECONÓMICAS DE APOYO A LA I+D"

In 2019, in this approved INFO (VT- ECOCIMUR) project a SWOT Analysis was carried out by CTNC on the state of the Circular Economy in the agri-food sector and in related organizations, following a University of Ghent methodology, in order to define the strategic priorities of the sector. This methodology has already been used by the CTNC in the AGFORISE FP7 Project.

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METRO FOOD-RO

Expertise

1. OBTAINING COMPOUNDS OF INTEREST. THE CTNC HAS EQUIPMENT TO DEVELOP EXTRACTION TECHNIQUES CONSIDERED AS GREEN TECHNIQUES
   - ❑ Enzymatic extraction
   - ❑ Subcritical water extraction
   - ❑ Microwave assisted extraction

Enzymatic extraction

Microwave assisted extraction

Subcritical water extraction

- ❑ Ultrasound assisted extraction
- ❑ Extraction by adsorption-desorption methods
- ❑ Supercritical CO2 extraction

Supercritical CO2 plant

adsorption-desorption columns

Ultrasound pilot plant

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Agro2Circular project

Unión Europea

A2C solution: Territorial circular systemic solution for the upcycling of residues from the Agro-food Sector

Programme

H2020-EU.3.5 Societal Challenges-Climate action, Environment, Resource Efficiency and Raw materials

Topic

LC-GD-3-2-2020-Demonstration of systemic solutions for territorial deployment of circular economy

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101036838.

Project Information

Agro2Circular

Grant agreement ID: 101036838

DOI

10.3030/101036838

Start date	End date
1 October 2021	30 September 2024

Funded under

SOCIETAL CHALLENGES - Climate action, Environment, Resource Efficiency and Raw Materials

Total cost

€ 16 757 026,91

EU contribution

€ 14 074 828,28

Coordinated by

ASOCIACION EMPRESARIAL DE INVESTIGACION CENTRO TECNOLOGICO DEL CALZADOY DEL PLASTICO DE LA REGION DE MURCIA

Spain

Centro Tecnológico Nacional de la Conserva y Alimentación

A2C Consortium: 41 partners from 11 European countries

Germany, Spain, Austria, United Kingdon, Italy, The Netherland, Finland, Belgium, Switzerland, Greece and Lithuania

Agro2circular

Unión Europea

6 RTOs

13 SMEs

6 Large Companies

5 Associations

4 NGOs

5 UNIs

2 Public administrations

This project has received funding from the European Union's Horizon 2020 Research and Innovation Action Programme under grant agreement Nº 101036838

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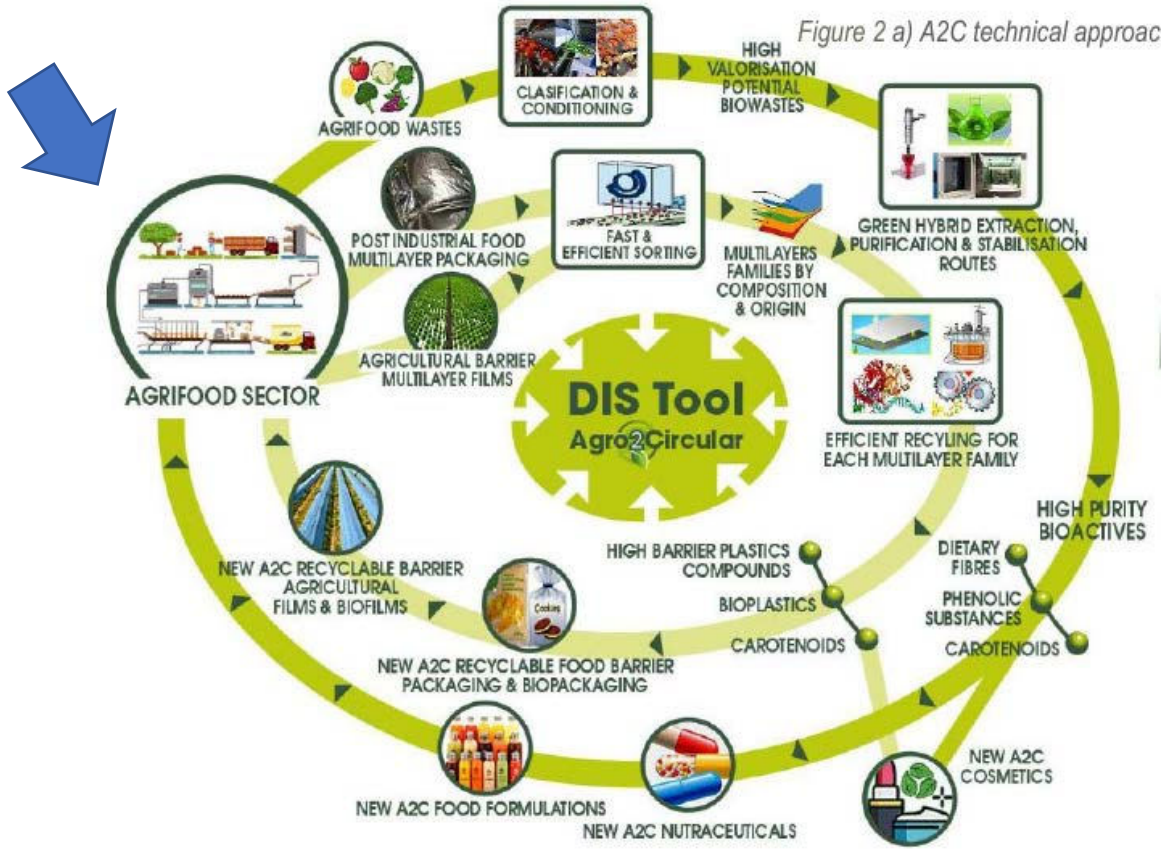
Agro2Circular

Unión Europea

METRO FOOD-RO

Agro2Circular project

Agro2Circular Value Chain



Circular solution

Objective 1: Demonstrating the first value chain for the upcycling of most representative agrifood sector wastes: Fruits&Vegetables and multilayer plastics

Objective 2: Providing to the A2C technological solution the circular systemic approach by building a multidimensional model enabling the **solution territorial** deployment and its replication and scalability.

Objective 3: Maximizing project impacts and facilitating A2C systemic solution **replication& scalability**

A2C will implement a demonstrator in the Region of Murcia that can be replicated in different regions of Europe for a territorial implementation of the circular economy.

This project has received funding from the European Union's Horizon 2020 Research and Innovation Action Programme under grant agreement Nº 101036838

Centro Tecnológico Nacional de la Conserva y Alimentación

Agro2Circular

Unión Europea

METRO FOOD-RO

Agro2Circular project

AGROFOOD WASTES AND SIDE STREAMS

CRUCIFEROUS INDUSTRY

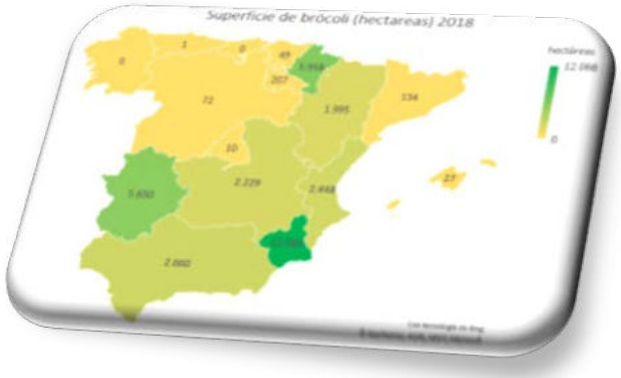
NDUSTRIAL WASTES

Broccoli Stems
Broccoli leaves

SUSTAINABLE PROCESSES

OBTAINING BIOCOMPOUNDS OF INTEREST

Pectin
Proteins
Dietary fiber
Phenolic compounds



CITRUS INDUSTRY

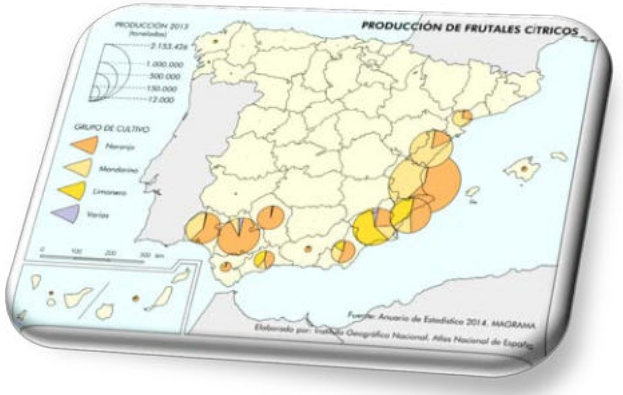
INDUSTRIAL WASTES

Peel
Pulp
skins
Seeds

SUSTAINABLE PROCESSES

BIOCOMPOUNDS OF INTEREST

Flavonoids
Essential oils
Carotenoids
Dietary fiber
Phenolic compounds
Coloring
Organic acids



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Centro Tecnológico Nacional de la Conserva y Alimentación

Agro2Circular project

OBTAINING ENRICHED BROCCOLI EXTRACTS

BY-PRODUCT

WASHING BY-PRODUCT

SHREDDING

EXTRACTION
Aqueous, enzymatic or ultrasonic

SEPARATION

SOLID PHASE

AQUEOUS PHASE

DEHYDRATION

Example for aqueous extraction

AQUEOUS PHASE

CONCENTRATION

LYOPHILIZATION

Example for aqueous extraction

	BROCCOLI BY-PRODUCT	AQUEOUS EXTRACTION	ENZYMATIC EXTRACTION	ULTRASONIC EXTRACTION
				
Determination of Compounds Interest (mg/kg)				
CHLOROGENIC ACID	13	<10	<10	<10
CAFFEIC ACID	18	<10	<10	<10
VITAMIN C	99	<55	< 55	<55
Determination of nutritional analysis (g/100g)				
EDIBLE FIBER	4,0	67,5	68,8	50,0
PROTEIN	2,8	16,2	13,7	11,1
TOTAL SUGARS	1,1	1,8	< 0,01	<0,1
Yield (% by weight of initial raw material)				
YIELD	-	5,4	4,43	3,0

	BROCCOLI BY-PRODUCT	AQUEOUS EXTRACTION	ENZYMATIC EXTRACTION	ULTRASONIC EXTRACTION
				
Determination of Compounds Interest (mg/kg)				
CHLOROGENIC ACID	13	<10	<10	<10
CAFFEIC ACID	18	109	75	49
VITAMIN C	99	<55	<55	185
TOTAL POLYPHENOLS	-	5237,9 (0,52%)	4643,2 (0,46%)	4821,6 (0,48%)
Determination of nutritional analysis (g/100g)				
EDIBLE FIBER	4,0	2,0	6,8	19,3
PROTEIN	2,8	17,6	16,2	33,3
TOTAL SUGARS	1,1	42,9	38,1	1,4
Yield (% by weight of initial raw material)				
YIELD	-	0,7	0,49	1,72

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Centro Tecnológico Nacional de la Conserva y Alimentación

Agro2Circular

Unión Europea

METRO FOOD-RO

Agro2Circular project

BROCCOLI BY-PRODUCT

AQUEOUS EXTRACTION

SOLID PHASE

CUTTER

H_2O_2 TREATMENT

WATER WASHING

DEHYDRATION

EXTRACTION

DEHYDRATION

Example for aqueous extraction
Purified extract

Example for aqueous extraction
Non purified extract

PURIFICATION OF ENRICHED BROCCOLI EXTRACTS

	BROCCOLI BY-PRODUCT	AQUEOUS EXTRACTION	PURIFIED FIBER
			
	Determination of nutritional analysis (g/100g)		
EDIBLE FIBER	4,0	67,5	➡ 70,8

This project has received funding from the European Union's Horizon 2020 Research and Innovation Action Programme under grant agreement Nº 101036838

Centro Tecnológico Nacional de la Conserva y Alimentación

Financiado por la Unión Europea NextGenerationEU

Plan de Recuperación, Transformación y Resiliencia

METRO FOOD·RO

Agromatter project

ESTABLISHMENT OF A CERVERA NETWORK FOR THE DEVELOPMENT OF HIGHLY SUSTAINABLE TECHNICAL MATERIALS DERIVED FROM BY-PRODUCTS OR WASTE FROM THE AGRICULTURAL INDUSTRY AND FROM CONSERVATION OPERATIONS OF NATURAL SPACES .

The **CERVERA AGROMATTER** Network comprises five complemetary Technological Centres in the fields of agriculture, biotechnology and materials science. Its aims are:

1. To establish a network of Technology Centres of scientific and technical excellence in the field of the Circular Economy applied to the development of bio-based materials applications
2. To gain a **recognition as R&D CENTRES OF REFERENCE** both at national and international levels
3. To grow in R&D projects and technology transfer to the industrial sector

agromatter

Centro Tecnológico Nacional de la Conserva y Alimentación

Financiado por la Unión Europea NextGenerationEU

Plan de Recuperación, Transformación y Resiliencia

METRO FOOD·RO

Agromatter project

agromatter

1. **AITEX:** Textile Industry Research Association – AITEX, is center for research, innovation and advanced technical services for the textile, habitat, clothing, technical textiles, cosmetics, beauty and other application sectors.

2. **ANDALTEC:** National Technological Centre focus in companies working with plastics as a product and related sectors.

3. **CTAEX:** National Agrifood Technological Centre Extremadura focus development methods of production, preservation and processing of agri-food products and rural development.

4. **CTNC:** National Technological Centre for Food and Canning Industry. Main Research lines: active packaging, new and traditional foods, agrifood wastes valorisation, natural ingredients and environment.

5. **ITENE:** Research Centre focus in four main areas: sustainable materials and technologies for the circular economy; design, safety and functionality in packaging; chemical exposure and air quality monitoring; and logistics and smart mobility.

Centro Tecnológico Nacional de la Conserva y Alimentación

Financiado por la Unión Europea NextGenerationEU

Plan de Recuperación, Transformación y Resiliencia

METRO FOOD-RO

Agromatter project

MAY 2021- DECEMBER 2023

SIDE STREAMS AND WASTES

- Olive industry
- Citrus industry
- Grape and wine industry
- Cereals industry
- Cruciferous industry
- River cane

APPLICATION SECTORS

- Textile
- Cosmetic
- Agrifood
- Plastic
- Packaging

Project financed by the CDTI (Center for Industrial Technological Development), through the Ministry of Science and Innovation of Spain, within the framework of grants for "Cervera" Technological Centers of Excellence. CER-20211013

https://www.redagromatter.com/en/

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Conclusions

METRO FOOD·RO

1. Involvement of food companies is of vital importance for the successful implementation of any food strategy (food safety, food sustainability, water and energy optimization, circular economy, etc.)
2. The transition to a circular economy is an obligation imposed by consumers, by society and by **“common sense”**.
3. Industries alone can not meet this chalenge. Other supporting actors are required: research centres, universities, policy makers, training organizations, technological centres, consumers associations, etc. They have to work together with companies.
4. European, national and regional administrations have to formulate public policies and collective actions to promote the new global agenda for sustainable development.
5. **Support from public administrations is essential to implement a successful CE strategy (green equipments, specialized staff, green jobs, etc.).**

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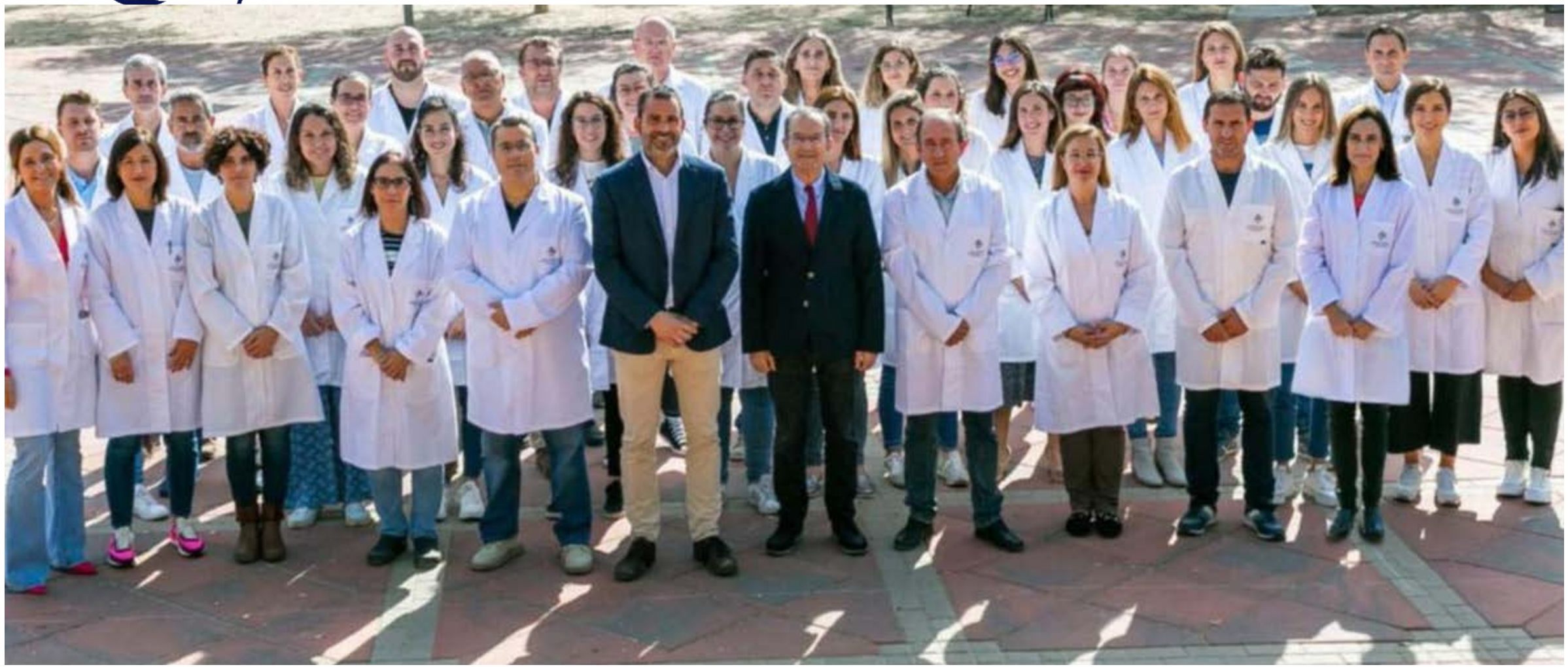

Mulțumesc foarte mult!!

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