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Circular Economy and Sustainable solutions for Agrifood in the Mediterranean

Work Package 5, Deliverable 5.1

Mapping of Relevant Topics, Challenges, Needs, Solutions, Actors and Experts from Each Region

Circular Economy Solutions in the Agri-food Sector in the Mediterranean

ACCIÓ Catalonia Trade & Investment
Generalitat de Catalunya Government of Catalonia
Co-funded by the European Union

Grant Agreement no. 101115023

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Content

Content

Occitania

About CESAM and the Mapping

The CESAM

CESAM (**Circular Economy and Sustainable Solutions in the Agri-food Sector in the Mediterranean**) is a European project which focuses on the regions of **Occitania, Catalonia and the Balearic Islands**

MAIN OBJECTIVES OF CESAM:

- Investments in **SMEs** to further a **circular economy model**
- Supporting investments in **interregional innovation**
- Furthering **sustainable solutions** in the value chains of the **agri-food** sector

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About CESAM and the Mapping

The CESAM

The **CESAM** project centres around the following areas:

- **Water Recycling:** water treatment, recycling or concentrated use of water
- **Packaging:** eco-conception, free from plastic, new materials or circular solutions
- **Byproduct valorisation**
- **Waste reduction:** process and circular process optimization

About CESAM and the Mapping

The Mapping

The **CESAM Mapping** consists of an identification of **actors, experts, challenges** and **solutions** in **Circular Economy in the Agri-food** sector in the Mediterranean. Namely, within the regions of **Occitania, Catalonia and the Balearic Islands.**

PURPOSE OF THE MAPPING:

- Providing an initial overview of the agrifood sector in Occitania, the Balearic Islands and Catalonia, and its actors such as companies, institutions, research and technological centers, clusters and associations.
- Providing an overview of some of the sustainable and circular economy solutions that actors in the agrifood sector are developing, or which can be applied to this sector. Classified according to the CESAM areas (*see previous slide).

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The Agrifood Sector in Catalonia

Biggest sector in the Catalan industry

19,2% of the **Catalan GDP**

57.427 agricultural holdings, **4.253 of food industries** and 658 auxiliary companies

43.088M€ turnover

25% (68M€) of spending in **R+D**

0,84% of spending in **innovation**

16% of Catalan exports

177.031 employees

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SOURCES: Annual Industry Report, ACCIÓ, 2022; The Agrofood Sector in Catalonia, January 2020, ACCIÓ, Prodeca, Generalitat de Catalunya

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Related Sectors in Catalonia

Water

Accounts for **4.480M€ turnover**

2,2% of the Catalan GDP

402 companies

Energy

Accounts for **2.322M€ turnover**

7,4% of the Catalan industrial GVA

335 companies

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SOURCES: Annual Industry Report, ACCIÓ, 2022; Sectorial Flash of Catalonia: Water, ACCIÓ, 2017

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Related Sectors in Catalonia

Packaging

Accounts for **7.100M€ turnover**

3,4% of the Catalan GDP

753 companies

Waste Management

1.268M€ GVA

2,9% of the Catalan industrial GVA

1.178 companies

SOURCES: Annual Industry Report, ACCIÓ, 2022) (The Packaging Sector in Catalonia, ACCIÓ, May 2017; Economical Report of the Waste Sector in Catalonia, ARC, Generalitat de Catalunya, Fundació Fòrum Ambiental, 2020

Circular Economy in the Agrifood Sector in Catalonia

Demand Companies

Agrifood

- Primary sector suppliers
- Additives and other ingredients
- Fertilizers and seeds
- Food processing and machinery
- Food and drinks industry
- Bulk shops, supermarkets and shops
- Waste management
- Vending machines

Chemistry and water

- Water treatment and reuse (e.g. **Derypol**)
- Chemical analysis
- Food safety

Packaging

- Packaging
- Packaging machinery (e.g. **Go Zero Waste**)

Supply Companies (B2B)

Circular design

- Consulting/engineering to redefine business/specific products or services related to circular economy; suppliers of renewable energies and technologies, related systems/installations; resource consumption minimisation technologies; materials/products for the circular economy; suppliers of new materials which can be recycled/repurposed; secondary materials/byproducts suppliers; suppliers of products for the circular economy using secondary raw materials

Optimization of use

- Repair and reparation for repurposing/remanufacturing products/assets; Servicification and technologies for use optimisation

Value recovery

- Recycling and material recovery; energy recovery; consulting and engineering for recovery solutions/reuse of water; technologies; equipment and installations for material recovery/water reuse

Universities

- Universitat Politècnica de Catalunya (UPC)
- UPF
- Universitat de Vic (Uvic)
- Universitat de Lleida (UdL)
- Universitat de Barcelona (UB)
- Universitat Autònoma de Barcelona (UAB)

Public Administration and Agencies

- **Catalonia Trade and Investment Agency (ACCIÓ)**
- Climate Action, Nutrition and Rural Agenda Department, Generalitat de Catalunya

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SOURCES: Sector Snapshot: Circular economy in Catalonia, December 2021; Sectorial Report: The Agrofood Sector in Catalonia, April 2022, ACCIÓ; The Greentech Catalogue, ACCIÓ, 2021

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Circular Economy in the Agrifood Sector in Catalonia

Technological and Research Centres

Agrifood

- Centre de Recerca en economia i desenvolupament agroalimentari (UPC – IRTA)
- dbA Centre de Desenvolupaments Biotecnològics Agroalimentaris
- LEiTaT
- CIDSAV
- CERTA (Universitat Autònoma de Barcelona)
- IRTA
- BETA

Environment, Ecology and Forestry

- Centro de Investigación Ecológica y Aplicaciones Forestales (CREAF)
- Centre de Ciència i Tecnologia Forestal de Catalunya (CTFC)
- CIDSAV
- Lequia (Universitat de Girona)
- Parc de Recerca UAB

Packaging and Plastics

- Centre Català del Plàstic

Water, Waste and Reuse

- Institut Català d'investigació química (ICIQ)
- Lequia (Universitat de Girona)
- ICRA
- A3 Leather Innovation Center
- AMIC

Biotechnology and others

- dbA Centre de Desenvolupaments Biotecnològics Agroalimentaris
- Parc Agrobiotech de Lleida
- Consejo Superior de Investigaciones Científicas (CSIC)
- LEiTaT
- CIDSAV
- CERTA (Uuniversitat Autònoma de Barcelona)
- Eurecat
- AMIC
- BETA
- Parc de Recerca UAB

Clusters and Associations

- INNOVI
- INNOVACC
- Clúster d'Energia Eficient de Catalunya (CEEC)
- Catalan Water Partnership (CWP)
- Packaging Cluster
- Solartys
- Foodservice Cluster
- Clúster de Bioenergia a Catalunya (CBC)
- Clúster de la Biomassa de Catalunya
- Espigoladors
- Pimec
- BIOHUB CAT
- Clúster de Fabricants de Béns d'Equip de Catalunya (CEQUIP)
- Catalonia Gourmet
- Agrupació Empresarial Innovacora (AEI)
- Clúster de la Maquinària i els Mitjans de Producció Agrícola (FEMAC)
- Cluster de Residus de Catalunya
- Plana de Vic Cooperativa
- Federació de Cooperatives Agràries de Catalunya
- Enginyers Agrònoms de Catalunya
- Asociación Citicultura Regenerativa
- Eit Food

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SOURCES: Sector Snapshot: Circular economy in Catalonia, December 2021; Sectorial Report: The Agrofood Sector in Catalonia, April 2022, ACCIÓ; The Greentech Catalogue, ACCIÓ, 2021

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Circular Economy challenges in the Agrifood sector in Catalonia

INNNOVATION AND TECHNOLOGY

WATER REUSE AND RECYCLING:

- Water treatment and reuse within the water cycle in industrial processes
- Recycling sludge resulting from water treatments
- Regeneration solutions (biotechnology and regenerative agriculture) applications in the agrifood sector

INNOVATION AND TECHNOLOGY for new **biomaterials** from agricultural **sub-products**

Technology to facilitate **CIRCULAR PROCESSES** in agroindustry:

- Tracking the origins and final destination of food products and their packaging
- Carbon footprint calculation of products on the market and their packaging
- Facilitating this information to customers in product packaging

KNOWLEDGE ON APPLICABLE LEGISLATION

LACK OF AWARENESS AND PREDICTIONS on the applicable EU, national and regional legislation:

- Intellectual Property Rights legislation applicable to circular economy solutions
- Health and hygiene regulations on reusable packaging and food containers
- The future of the EU legislative framework
- The future of the applicable national and regional legislation regarding circular economy in the agrifood sector and water

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SOURCES: Consultation with consortium SMEs

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Circular Economy challenges in the Agrifood sector in Catalonia

SOLUTION FOR CIRCULAR ECONOMY MODELS

ECODESIGN:

- For agrifood products intended to be sustainable and to have a long life cycle
- Made of materials which can be reused, recycled and/or biodegradable

FINANCIAL SUPPORT

- Financial support for the creation and implementation of new circular economy models and their implementation
- Implementation of circular economy best practices in the agrifood sector

AWARENESS-RAISING AND PROMOTION

- Awareness-raising and promotion of the difference in quality of agricultural and food products when implementing circular economy solutions
- Emphasizing the different properties, nutrition and quality of agrifood products from the fields
- Taking the views of farmers into account

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(Consultation with consortium SMEs)

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Circular Economy Solutions in the Agrifood Sector in Catalonia

Solvent-Free Flocculants to increase Wastewater Sludge Reusability

derypol

To increase the reusability of sludge from wastewater treatment plants for application in agriculture, composting, or energy production in a thermal dryer.

PAASIOT: Packaging as a Service IoT

go zero waste

To produce and scale an IoT dispenser for reusable packaging that enables waste-free shopping.

ECORKWASTE

eurecat Centre Tecnològic de Catalunya

Reuse of cork waste for water treatment and recycling

Nature-based solutions for food production and water treatment

lequia UdG

To establish nature-based solutions (NBS) for food production and decentralized water treatment in cities by enabling onsite water reclamation, along with the provision of ecosystem services.

Organic residues for nutraceuticals and food supplements

SITEC pharmabio

To transform extracts obtained from agro-industrial waste into food supplements and nutraceutical products rich in bioactive molecules.

BIONITRATE

BiomaGroup

To remove nitrates from water obtaining a nitrate waste that can be used as a fertilizer .

NOTE: This is an overview of some of the sustainable and circular economy solutions that actors in the agrifood sector are developing, or which can be applied to this sector

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SOURCES: The Greentech Catalogue, ACCIÓ, 2021; Consultations with companies and research centres

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Circular Economy Solutions in the Agrifood Sector in Catalonia

VALORA	BIOPLAST
Using agroindustrial waste as a resource for the production of bioplastics	Development of bioplastics from renewable resources including agrifood waste
FERTIMANURE	**Natural Preservation Technology**
To value agrowaste for biofuel production and adaptation of composting plants	Development of compostable and biodegradable edible packaging based on the natural preservative components that food has
Creation of proteins, oils and fertilizers from organisms	**BIOBOOST**
Waste transformation to proteins, oils and organic fertilizers through organisms	Building a bioeconomy accelerator in Catalonia which assists in project development and investment realisation

NOTE: This is an overview of some of the sustainable and circular economy solutions that actors in the agrifood sector are developing, or which can be applied to this sector

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Circular Economy Solutions in the Agrifood Sector in Catalonia

CIRCULAR AGRONOMICS	NUTRI2CYCLE
IRTA Improvement of Carbon, Nitrogen and Phosphor cycles within the agrifood value chain for resource efficiency	IRTA Nurturing the circular economy through a transition towards a more carbon and nutrient efficient agriculture in Europe
Larvae as a biological tool for the circular economy of agri-food waste	**Tannins from pine bark by-products**
La Conca de Jordà Use of larvae as a means for the optimal degradation of waste from the agri-food sector	CTFC Production of tannins from locally sourced pine bark by-products
High-tech biomaterials and bioplastics	**HORTIVALOR**
Dan*nap artificial nature To develop and produce high value-added new biomaterials and bioplastics to solve the challenges of the cutting-edge technology industry.	IRTA Valorisation of organic fruits and vegetable surplus by using emerging technologies for the development of innovative smoothies and creams
Injective Moulding Material	
PACK2EARTH	Compostable moulding material

NOTE: This is an overview of some of the sustainable and circular economy solutions that actors in the agrifood sector are developing, or which can be applied to this sector

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Solvent-Free Flocculants to increase Wastewater Sludge Reusability

derypol

Catalonia

CESAM Areas

Water recycling
Byproduct valorisation
Waste reduction

Challenges

Access to water, sanitation and water treatment and efficient use of water resources;
Industrial transition to the circular economy;
Climate change mitigation and adaptation

SDGs impact

Objective / Challenge

To increase the reusability of sludge from wastewater treatment plants for application in agriculture, composting, or energy production in a thermal dryer.

Environmental impacts and benefits addressed

- ✓ Reduce the environmental impact of nutrient waste coming from animal farm manure.
- ✓ Minimise the VOC's (Volatile Organic Compounds) emissions into the atmosphere.
- ✓ Minimise the amount of solvents remaining in the sludge after treatment at the wastewater treatment plants (WWTP).

Solution's description

- ✓ Production of aqueous dispersion polymers to extract nutrient-enriched solids from liquid wastewater, without adding solvents.
- ✓ This solution adds value to agriculture, as nutrients are recovered, and to biogas plants as a source of energy production.
- ✓ It also brings added value to WWTP, as the sludge produced can be reused instead of eliminated.

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KPIs

- 3 times less carbon footprint than solvent emulsion polymers.
- No solvents, surfactants, or mineral oils are added to the WWTP sludge.
- Lower residual monomers compared to powder polymers.
- Residual acrylamide (<10 ppm) and acrylamide-free polymers available.
- FDA GRAS certified polymers.

PAASIOT: Packaging as a Service IoT

go zero waste

Catalonia

CESAM Areas

Packaging
Waste reduction

Challenges

Sustainability of food production systems; Industrial transition to the circular economy; Climate change mitigation and adaptation

SDGs impact

Objective / Challenge

To produce and scale an IoT dispenser for reusable packaging that enables waste-free shopping.

Environmental impacts and benefits addressed

- ✓ Reduce waste and single-use products.
- ✓ Promote circular economy and responsible consumption.
- ✓ Reduce packaging and waste generation costs.

Solution's description

- ✓ An IoT dispenser that enables the user to obtain reusable packaging though an App.
- ✓ The packaging is returned after its use and sent to a cleaning station for its replenishment.
- ✓ All packaging is trackable thanks to an IoT program.

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KPIs

- Operative prototype.
- First pilots

Partners

*Sparsity

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EKORKWASTE

eurecat
Centre Tecnològic de Catalunya

Catalonia

CESAM Areas

Water recycling
Waste reduction
Byproduct valorisation

Challenges

Industrial transition to the circular economy;
Climate change mitigation and adaptation

SDGs impact

Objective / Challenge

Reuse of cork waste for water treatment and recycling

Environmental impacts and benefits addressed

- ✓ Reduction of cork waste
- ✓ Reuse of cork waste
- ✓ Water treatment and recycling
- ✓ Reduction of CO_2 emissions

Solution's description

- ✓ Valorisation of cork waste as an absorbent material in wetlands
- ✓ For the elimination of organic compounds from residual waters of the wine industry
- ✓ Energy valorisation in the gas plant

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ecork waste

KPIs

- Installation of an artificial wetland at the Codorniu group facilities
- Installation of a gas plant at Eurecat's facilities in Manresa

Partners

TYPSA
INSTITUT CATALÀ DEL SURO
CODORNÍU
INNOVI Clúster Vitivinícola Català

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Nature-based solutions for food production and water treatment

lequia UdG

Catalonia

CESAM Areas

Water recycling
Waste reduction

Challenges

Access to water, sanitation, water treatment and efficient use of water resources; Climate change mitigation and adaptation; Sustainability of food production systems; Climate-neutral and circular cities

SDGs impact

Objective / Challenge

To establish nature-based solutions (NBS) for food production and decentralized water treatment in cities by enabling onsite water reclamation, along with the provision of ecosystem services.

Environmental impacts and benefits addressed

- ✓ Reduce pressure on the potable water supply and minimize the impact of food production.
- ✓ Provide with ecosystems services such as thermal regulation, well being and increment of biodiversity.
- ✓ Improve liveability and social cohesion.

Solution's description

- ✓ Methodology and tools to facilitate implementation of NBS for food production or urban food initiatives.
- ✓ Innovative NBS (technology) for the treatment of urban wastewaters, especially greywater, aiming at safe onsite water reuse schemes.
- ✓ Replication of natural processes with principles of circular economy are combined.

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KPIs

- Mass of food produced per m^2 of NBS.
- Potential to treat (daily) between 10-100 L of greywater per m^2 of NBS.
- Use of vertical empty spaces, which is especially relevant in highly dense cities.

Partners

ICRA Institut Català de Recerca de l'Aigua

Ajuntament de Girona

Edible Cities Network

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Organic residues for nutraceuticals and food supplements

SITEC pharmabio

Catalonia

CESAM Areas

Byproduct valorisation
Waste reduction

Challenges

Sustainability of food production systems; Industrial transition to the circular economy; Climate change mitigation and adaptation

SDGs impact

Objective / Challenge

To transform extracts obtained from agro-industrial waste into food supplements and nutraceutical products rich in bioactive molecules.

Environmental impacts and benefits addressed

- ✓ Contribute to biomolecules recovery and valorisation in a circular economy environment.
- ✓ Introduce innovative, solvent-free , environmentally sustainable technologies based on carbon dioxide.

Solution's description

- ✓ A CO_2-based cryospraying process (CryoXpand®) to transform natural extracts from agro-industrial waste into easy-to-handle, formulated microparticles in powder form.
- ✓ Micronized products designed to improve biomolecules solubility and absorption can be used as food supplements or further processed into nutraceutical products.
- ✓ The solution processes complex extracts from tomato skins, wine lees, rice husk, into formulated, micronized powders containing valuable biomolecules such as lycopene, ɣ-oryzanol, resveratrol, polyphenols, and natural fibers.

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KPIs

CryoXpand® microspheres technology:

- High product output: up to 50 Kg/h at pilot scale.
- Low CO_2 consumption: <1.5 Kg CO_2/Kg product.
- Economically viable: low cost/kg.
- Solvent-free, CO_2-based processing.
- Applicable to nutraceutical, dermoceutical and pharmaceutical products.

Partners

exonia

FARMACEUTICI PROCEMSA

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BIONITRATE: Water nitrates removal and waste reuse as a fertilizer

BiomaGroup®
environmental solutions

Catalonia

CESAM Areas

Water recycling
Byproduct valorisation
Waste reduction

Challenges

Access to water, sanitation, water treatment and efficient use of water resources; Industrial transition to the circular economy; Regeneration of natural capital in terrestrial ecosystems; Climate change mitigation and adaptation

SDGs impact

Objective / Challenge

To remove nitrates from water obtaining a nitrate waste that can be used as a fertilizer .

Environmental impacts and benefits addressed

- ✓ Reduce nitrate pollution in water bodies.
- ✓ Promote circular economy through the valorisation of nitrates as a fertilizer.
- ✓ Ensure self-sufficiency of water resources.

Solution's description

- ✓ The solution is based on the chemical substitution of active elements in the conventional resin to produce drinking water.
- ✓ A modified Ion Exchange Resins to remove nitrates from water is used.
- ✓ A nitrate-enriched waste is obtained which can be used as a liquid fertilizer or as a nutritive complement in biological water treatments.

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KPIs

- More than 95% of recovered water for drinking.
- Around 3-5% as liquid fertiliser.

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VALORA

Beta
Biodiversitat, Ecologia, Tecnologia Ambiental i Alimentària

Catalonia

CESAM Areas

Waste reduction
Byproduct valorisation
Packaging

Challenges

Sustainability of food production systems;
Industrial transition to the circular economy;
Sustainable mobility;
Climate change mitigation and adaptation

SDGs impact

Objective / Challenge

Using agro-industrial waste as a resource for the production of bioplastics

Environmental impacts and benefits addressed

- ✓ Manage and reuse agro-industrial waste
- ✓ Employ a circular economy process to treat agro-industrial waste
- ✓ Reduce the use of normal plastic

Solution's description

- ✓ Production of biodegradable plastics from solid agro-industrial waste as a raw material
- ✓ Use of waste with a high quantity of carbon contained which are produced in the local area
- ✓ The microorganisms selected will thus be able to accumulate part of thius carbon within their cells
- ✓ The project uses fermentation in solid state (FSS) as a potential economically effective and sustainable alternative process
- ✓ Development of a production system that is technically functional and competitive among technologies using a liquid fermentation process

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KPIs

- Tons of agroindustrial waste used
- Tons of bioplastics produced

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BIOPLAST

dbA

Catalonia

CESAM Areas

Waste reduction
Byproduct valorisation
Packaging

Challenges

Sustainability of food production systems;
Industrial transition to the circular economy;
Sustainable mobility;
Climate change mitigation and adaptation

SDGs impact

Objective / Challenge

Development of bioplastics from renewable resources including agrifood waste

Environmental impacts and benefits addressed

- ✓ Valorisation of agrifood waste
- ✓ Substitution of normal plastic with bioplastic

Solution's description

- ✓ Use of renewable resources, such as agrifood waste, to develop bioplastics
- ✓ Establishing a value chain which includes the study of its later treatment (composting) under a circular economy perspective
- ✓ Evaluation of biodegradable plastics and actual trends in the market
- ✓ Evaluation and study of the diferent waste corrents in the agrifood sector for the fabrication of PHAs (bioplastic)

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BIOPLAST

KPIs

- ons of bioplastic produced
- Results of the evaluation of bioplastics
- Tons of agrifood waste used
- Results of agrifood waste evaluation

Partners

APESA · CATAR Agro Ressources · GAIKER · INSA Institut National des Sciences Appliquées Toulouse · Universitat de Girona · Universitat de Lleida · INRAE · tbi · Interreg POCTEFA

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Biodrying for animal manure valorization into biofuel (FERTIMANURE)

Beta UVIC UNIVERSITAT DE VIC UNIVERSITAT CENTRAL DE CATALUNYA

Catalonia

CESAM Areas

Byproduct valorisation
Waste reduction

Challenges

Sustainability of food production systems; Clean energy transition; Sustainable mobility; Climate change mitigation and adaptation

SDGs impact

Objective / Challenge

To value agri-waste for biofuel production and adaptation of composting plants.

Environmental impacts and benefits addressed

- ✓ Offer valorisation of low value animal manure.
- ✓ Increase energetic self-sufficiency of farms.
- ✓ Reduce the environmental impact of animal manure.

Solution's description

- ✓ The solution valorises organic waste from animal manure into a biofuel (LHV > 2.500 kcal/kg), which can be used in conventional biomass boilers.
- ✓ The developed technology is based on bio-drying process, which enables the use of metabolic heat, produced by biologic activity, to remove the water content of the matrix in the shortest time, while minimizing the organic matter degradation and keeping the heat value of the material.
- ✓ This technology is also a solution for phosphorus recovery from the ashes obtained after the biofuel combustion, in order to be applied as fertilizer in an easy way.

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KPIs

- Reduction of costs.
- Increase circularity of the exploitations.

Partners

Generalitat de Catalunya Departament d'Agricultura, Alimentació i Acció Rural

PLANA DE VIC COOPERATIVA Junts cuidem l'origen

LEITAT managing technologies

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European Commission | Horizon 2020 European Union Funding for Research & Innovation

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Natural preservation technology

Bio2Coat

Catalonia

CESAM Areas

Packaging
Waste reduction

Challenges

Sustainability of food production systems;
Industrial transition to the circular economy;
Climate change mitigation and adaptation

SDGs impact

Objective / Challenge

To tackle food waste and excessive use of plastic packaging in the agri-food value chain.

Environmental impacts and benefits addressed

- ✓ Contribute to the reduction of food waste.
- ✓ Avoid plastic packaging.
- ✓ Provide a 100% natural and sustainable edible coating.
- ✓ Preserve the nutritional value and prolong the freshness of the product.

Solution's description

- ✓ Development of compostable and biodegradable edible packaging based on the natural preservative components that food has.
- ✓ Production of edible films and coatings.
- ✓ The produced coating is colourless, odourless, and has no impact on the food flavour.
- ✓ Technology developed and created by UPC researchers.

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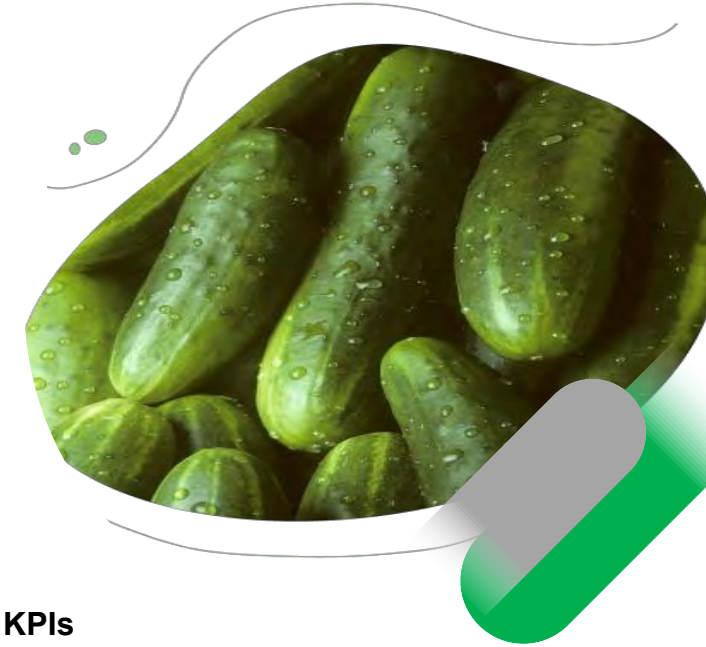

KPIs

- Up to 30% weight loss reduction in fruit.
- Up to 15 days of fruit shelf-life extension.
- 100% natural ingredients.
- Improve visual aspects.

Partners

UNIVERSITAT POLITÈCNICA DE CATALUNYA BARCELONATECH

CDTI @CDTIoficial

eit Food

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Creation of proteins, oils and fertilizers from organisms

PHOENIXFOODS

Catalonia

CESAM Areas

Waste reduction
Byproduct valorisation

Challenges

Industrial transition to the circular economy;
Climate change mitigation and adaptation

SDGs impact

Objective / Challenge

Waste transformation to proteins, oils and organic fertilizers through organisms

Environmental impacts and benefits addressed

- ✓ Waste reduction
- ✓ Recycling waste
- ✓ By-product valorisation
- ✓ Reduction of CO2 emissions through a reduction of transportation

Solution's description

- ✓ Use of detrivore organisms for the generation of proteins, oils and organic fertilizers
- ✓ High added value and respectful of the environment
- ✓ Reuse of waste through local response to emerging needs

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KPIs

- Reduction of CO2 emissions
- Waste reduction
- Valorisation of waste

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BIOBOOST

Símbiosy

Catalonia

CESAM Areas

Waste reduction
Byproduct valorisation

Challenges

Industrial transition to the circular economy; Regeneration of natural capital in terrestrial ecosystems; Sustainability of food production systems; Climate change mitigation and adaptation

SDGs impact

Objective / Challenge

Building a bioeconomy accelerator in Catalonia which assists in project development and investment realisation

Environmental impacts and benefits addressed

- ✓ Fostering the creation of bioeconomy sustainable and circular economy solutions
- ✓ Supporting investment in the development of bioeconomy projects

Solution's description

- ✓ European project (Horizon Europe) which aims at activating Catalonia's potential to become a centre in the development of bioeconomy in Europe
- ✓ Building a project accelerator on bioeconomy, which assists in overcoming systematic obstacles to the realisation of investment in bioeconomy projects
- ✓ An office providing support services for the development of bioeconomy and technological innovation projects from June 2023
- ✓ Seeks to mobilize 30€M of investment in projects within the bioeconomy sector in Catalonia before 2026

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BIO BOOST Acceleradora de projectes de bioeconomia

KPIs

- Establishing an accelerator office that provides assistance to bioeconomy project development
- Technical, financial and business, legal and administrative, mapping and facilitation services provided
- Number of biobooster projects supported until 2026

Partners

aeris

RocaJunyent

inveniam

Funded by the European Union

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CIRCULAR AGRONOMICS

IRTA

Catalonia

CESAM Areas

Waste reduction
Byproduct valorisation

Challenges

Industrial transition to the circular economy;
Sustainability of food production systems;
Climate change mitigation and adaptation

SDGs impact

Objective / Challenge

Improvement of Carbon, Nitrogen and Phosphor cycles within the agrifood value chain for resource efficiency

Environmental impacts and benefits addressed

- ✓ Responding to climate change
- ✓ Implementation of circular economy processes within agriculture
- ✓ Addressing water pollution, ammonium and greenhouse gas emissions

Solution's description

- ✓ Complete synthesis of practical solutions for the improvement of the current Carbon, Nitrogen and Phosphor cycles in agricultural ecosystems
- ✓ Improvement of these cycles in up and down-stream processes within the agrifood value chain
- ✓ Solution for the advancement towards making agriculture an integral part of circular economy through increasing resource efficiency
- ✓ Addressing the related climate challenges such as ammonium emissions, water pollution (eutrophication), as well as greenhouse gas emissions

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Circular Agronomics

KPIs

- Resource efficiency in agrifood value chain processes
- Reduction of water pollution
- Reduction of ammonium and greenhouse gas emissions

Horizon 2020 European Union Funding for Research & Innovation

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NUTRI2CYCLE

IRTA

Catalonia

CESAM Areas

Waste reduction
Byproduct valorisation

Challenges

Industrial transition to the circular economy;
Sustainability of food production systems;
Climate change mitigation and adaptation

SDGs impact

Objective / Challenge

Nurturing the circular economy through a transition towards a more carbon and nutrient efficient agriculture in Europe

Environmental impacts and benefits addressed

- ✓ Efficient and sustainable farm business models
- ✓ Waste reduction and resource recycling
- ✓ Information to end-users through labelling, and knowledge sharing

Solution's description

- ✓ European project (Horizons 2020) aimed at nurturing the circular economy through a transition towards a more carbon and nutrient efficient agriculture in Europe
- ✓ This project assessed the current Nitprogen, Phosphorus and Carbon flows within existing management techniques in farms across Europe and analysed the related environmental problems
- ✓ From 2018 to 2022 it tackled existing flow gaps in Europe and helped decrease greenhouse gas emissions, reduce soil degradation and improve EU independence for energy and nutrients
- ✓ The research focused on agro-processing, animal husbandry and plant processing

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KPIs

- Efficient and sustainable farm business models for nutrient recovery and recycling
- Sharing results at a national and European level
- Labelling of products obtained through the identified business models, to reach end-users
- Scientific support on effective regulatory frameworks

Partners

EBA European Biogas Association · CARTIF · inagro · THÜNEN · Københavns Universitet · Politechnika Częstochowska · SCITUB · Wageningen University & Research · casasc · United Xperts · Università degli Studi di Milano · Universiteit Gent · ZLTO

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 773882

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Larvae as a biotechnological tool for the circular economy of agri-food waste

La Conca de la Tordera

Catalonia

CESAM Areas

Waste reduction
Byproduct valorisation

Challenges

Industrial transition to the circular economy;
Sustainability of food production systems;
Climate change mitigation and adaptation

SDGs impact

Objective / Challenge

Use of larvae as a means for the optimal degradation of waste from the agri-food sector

Environmental impacts and benefits addressed

- ✓ Waste management and reduction
- ✓ Recycling and natural degradation of waste
- ✓ Circularity through converting waste into food for larvae

Solution's description

- ✓ Introduction of insects as a biotechnological tool for the circular economy of waste from the agri-food industry
- ✓ Study of breeding of larvae adapted to the local (Maresme) conditions
- ✓ Identify the conditions of preparation for larvae to obtain the optimal degradation of waste in its highest possible quantity

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KPIs

- Quantity of agri-food waste recycled

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Tannins from pine bark by-products

CTFC

Catalonia

CESAM Areas

Waste reduction
Byproduct valorisation

Challenges

Industrial transition to the circular economy; Regeneration of natural capital in terrestrial ecosystems;
Climate change mitigation and adaptation

Objective / Challenge

Production of tannins from locally sourced pine bark by-products

Environmental impacts and benefits addressed

- ✓ Use of locally sourced resources
- ✓ Reduction of emissions from long-distance transportation
- ✓ Climate change mitigation

Solution's description

- ✓ Production of tannins from local white pine bark by-products
- ✓ Obtaining tannins and other aromatic composts with the capacity of being used in the treatment of skins
- ✓ Substituting the use of non-local spices for resources with a local origin
- ✓ Mitigation of climate change

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KPIs

- Locally sourced resources
- Reduction of emissions
- Quantity of tannins produced

Partners

LEATHER QUIMICA

inèdit

Combalia EST. 1900

SDGs impact

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High-tech biomaterials and bioplastics

Danimer artificial nature

Catalonia

CESAM Areas

Waste reduction
Byproduct valorisation
Packaging

Challenges

Industrial transition to the circular economy;
Sustainability of food production systems;
Climate change mitigation and adaptation

SDGs impact

Objective / Challenge

To develop and produce high value-added new biomaterials and bioplastics to solve the challenges of the cutting-edge technology industry.

Environmental impacts and benefits addressed

- ✓ Use 100% sustainable and functional bio-based materials.
- ✓ Provide a sustainable model of industry through the circular economy.
- ✓ Reduce organic and electronic waste.

Solution's description

- ✓ Biological residues of plant or animal origin are used to develop bioplastics (PHA, PLA, BPS, PEF).
- ✓ The transformation of raw material to bioplastics is achieved through molecular technology, green chemistry processes, and Artificial Intelligence.
- ✓ Improvement of the physical properties of bioplastics to adapt them to the production process and the needs of the final product.

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KPIs

- 70% of organic waste recovered in a bioproduct.
- 80% reduction in electronic waste.
- 82% reduction in energy use in substitution of metal processing.

HORTIVALOR

IRTA

Catalonia

CESAM Areas

Waste reduction
Byproduct valorisation

Challenges

Industrial transition to the circular economy;
Sustainability of food production systems;
Climate change mitigation and adaptation

SDGs impact

Objective / Challenge

Valorisation of organic fruits and vegetable surplus by using emerging technologies for the development of innovative smoothies and creams

Environmental impacts and benefits addressed

- ✓ Reaching a long shelf-life of the final products
- ✓ Preserving all the nutritional values and bioactive compounds found in fresh fruits and vegetables

Solution's description

- ✓ The main objective of the project has been the production of smoothies and creams from organic fruits and vegetable surplus.
- ✓ Potential raw materials with suitable characteristics have been identified by investigating the characteristics of ecological productions without commercial value, like fruit/vegetable surplus and products which are not suitable for the market because do not reach the standard quality parameters.
- ✓ Afterwards, innovative smoothie and creams formulations added with whey have been developed and stabilised by cold pasteurization (High Pressure Processing technology) to guarantees the safety and preserve the nutritional properties of the final products.
- ✓ The development of these products could promote the waste reduction and the valorisation of underexploited agrifood resources of Catalan SMEs

KPIs

- Identification of raw materials with optimal properties
- Control and improvement measures for smoothie and cream production
- PHA treatment validation
- High added-value products

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Departament d'Agricultura, Ramaderia, Pesca i Alimentació

Fons Europeu Agrícola de Desenvolupament Rural:
Europa inverteix en les zones rurals

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INJECTION MOULDING MATERIAL

PACK2EARTH

Catalonia

CESAM Areas

Waste reduction
Packaging
Byproduct valorisation

Challenges

Industrial transition to the circular economy; Sustainability of food production systems; Climate change mitigation and adaptation

SDGs impact

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Objective / Challenge

Compostable moulding material

Environmental impacts and benefits addressed

- ✓ Plastic reduction
- ✓ Organic and plastic waste reduction
- ✓ Compostable material
- ✓ Valorisation of organic waste

Solution's description

- ✓ The injection moulding material is biobased and compostable at ambient temperature
- ✓ It is suitable for long shelf-life dry to semiliquid products, and some liquids
- ✓ It can be discarded with potato peal and other organic waste or directly composted at home. It decomposes into a toxin-free and microplastic-free compost that can sustain new plant life
- ✓ It is suitable to manufacture caps, fitments, cups or other recipients manufactured on a mould. It can be manufactured and used in packaging manufacturers' and co-packers' existing machinery
- ✓ Cups manufactured with this material can be washed and reused up to 200 times
- ✓ This solution can also be used as a flexible film to seal containers

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KPIs

- Cups manufactured with the material are washable up to 200 times
- Suitable for long shelf-life dry to semiliquid and some liquid products
- Compostable

Partners/Supporters

Gobierno de España · Ministerio de Ciencia e Innovación · Co-funded by the Horizon 2020 programme of the European Union · eit Food · Co-funded by the Horizon 2020 programme of the European Union · ACCIÓ · Generalitat de Catalunya · Tecniospring INDUSTRY

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By CESAM Areas

CESAM Areas	Companies	Solutions
WATER RECYCLING	derypol	Solvent-free flocculants to increase wastewater sludge reusability
	BiomaGroup® environmental solutions	BIONITRATE: water nitrates removal and waste reuse as a fertilizer
	eurecat Centre Tecnològic de Catalunya	ECORKWASTE: reusing cork waste for water treatment and recycling
	lequia UdG	Nature-based solutions for food production and water treatment

By CESAM Areas

CESAM Areas	Companies	Solutions
PACKAGING	go zero waste	PAASSIOT: Packaging as service IoT
	BIO2COAT	Natural preservation technology
	Dan*nn artificial nature	High-tech biomaterials and bioplastics
	dbA	BIOPLAST: Development of bioplastics from renewable resources including agrifood waste
	Beta Biodiversitat, Ecologia, Tecnologia Ambiental i Alimentària	VALORA: Using agroindustrial waste as a resource for the production of bioplastics
	PACK2EARTH	Injection Moulding Material

By CESAM Areas

CESAM Areas	Companies	Solutions
WASTE REDUCTION	CTFC	Tannins from pine bark by-products
	Danone artificial nature	High-tech biomaterials and bioplastics
	derypol	Solvent-free flocculants to increase wastewater sludge reusability
	go zero waste	PAASSIOT: Packaging as a service IoT

By CESAM Areas

CESAM Areas	Companies	Solutions
WASTE REDUCTION	eurecat Centre Tecnològic de Catalunya	**ECORKWASTE: reusing cork waste for water treatment and recycling**
	lequia UdG	**Nature-based solutions for production and water treatment**
	La Cònca de la Tordera	Larvae as a biotechnological tool for the circular economy of agri-food waste

By CESAM Areas

CESAM Areas	Companies	Solutions
WASTE REDUCTION	PHOENIXFOODS	Creation of proteins, oils and fertilizers from organisms
	Símbiosy	BIOBOOST: building a bioeconomy accelerator in Catalonia
	SITEC pharmabio	Organic residues for nutraceuticals and food supplements

By CESAM Areas

CESAM Areas	Companies	Solutions
WASTE REDUCTION	BIO2COAT	Natural preservation technology
	Beta UVIC UNIVERSITAT DE VIC UNIVERSITAT CENTRAL DE CATALUNYA	FERTIMANURE: Biodrying for animal manure valorization into biofuel
		VALORA: Using agroindustrial waste as a resource for the production of bioplastics
	BiomaGroup® environmental solutions	BIONITRATE: water nitrates removal and waste reuse as a fertilizer
	dbA	BIOPLAST: Development of bioplastics from renewable resources including agrifood waste

By CESAM Areas

CESAM Areas	Companies	Solutions
WASTE REDUCTION	IRTA	NUTRI2CYCLE: Nurturing the circular economy through a transition towards a carbon and nutrient efficient agriculture
		CIRCULAR AGRONOMICS: Improvement of Carbon, Nitrogen and Phosphor cycles in the agrifood value chain for resource efficiency
		HORTIVALOR: Valorisation of organic fruits and vegetable surplus by using emerging technologies for the development of innovative smoothies and creams
	PACK2EARTH	Injection Moulding Material

By CESAM Areas

CESAM Areas	Companies	Solutions
BYPRODUCT VALORISATION	CTFC	Tannins from pine bark by-products
	La Conca de la Tordera	Larvae as a biotechnological tool for the circular economy of agri-food waste
	derypol	Solvent-free flocculants to increase wastewater sludge reusability
	eurecat Centre Tecnològic de Catalunya	ECORKWASTE: reusing cork waste for water treatment and recycling
	PHOENIXFOODS	Creation of proteins, oils and fertilizers from organisms

By CESAM Areas

CESAM Areas	Companies	Solutions
BYPRODUCT VALORISATION	Símbiosy	BIOBOOST: building a bioeconomy accelerator in Catalonia
	eurecat Centre Tecnològic de Catalunya	ECORKWASTE: reusing cork waste for water treatment and recycling
	SITEC pharmabio	Organic residues for nutraceuticals and food supplements
	Danone artificial nature	High-tech biomaterials and bioplastics
	IRTA	HORTIVALOR: Valorisation of organic fruits and vegetable surplus by using emerging technologies for the development of innovative smoothies and creams
		NUTRI2CYCLE: Nurturing the circular economy through a transition towards a carbon and nutrient efficient agriculture
		CIRCULAR AGRONOMICS: Improvement of Carbon, Nitrogen and Phosphor cycles in the agrifood value chain for resource efficiency

By CESAM Areas

CESAM Areas	Companies	Solutions
BYPRODUCT VALORISATION	Beta UVIC UNIVERSITAT DE VIC UNIVERSITAT CENTRAL DE CATALUNYA	VALORA: Using agroindustrial waste as a resource for the production of bioplastics
		FERTIMANURE: Biodrying for animal manure valorization into biofuel
	BiomaGroup® environmental solutions	BIONITRATE: water nitrates and waste reuse as a fertilizer
	dbA	BIOPLAST: Development of bioplastics from renewable resources including agrifood waste
	PACK2EARTH	Injection Moulding Material

The Agrifood Sector in the Balearic Islands

4,4% of the GDP of the Balearic Islands

10.496 agricultural holdings, and **465** food industries

161 M€

0,6 M€ in innovation

7 M€ spent in R+D

57 M€ of exports of the Balearic Islands

36.585 employees (active)

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SOURCES: Ministerio de Agricultura, Pesca y Alimentación, 2022, available at: https://www.mapa.gob.es/es/ministerio/servicios/analisis-y-prospectiva/informe_indicadores_i_baleares_2022_tcm30-560958.xlsx ; Clúster TEIB Dades estadístiques de la producció agrària ecològica Illes Balears, 2022, EAE, acessible at: http://www.cbpae.org/files/EAE_2022.pdf; Institut de Recerca i Formació Agroalimentària i Pesquera de les Illes Balears (IRFAP), Exportacions i Importacions de les Illes Balears, 2022, available at: https://www.caib.es/sites/semilla/ca/exportacions_i_importacions_de_les_illes_balears_2018-2020/. Consultation with Fundació BIT

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Circular Economy in the Agrifood Sector in the Balearic Islands

Demand Companies

Agrifood

- Packaging of oil and wine
- Bread and pastries, spices, preserved goods and vegetable or fruit juices manufacturers
- Nuts, meat and charcuterie, wine and cava, cereals, fruit and vegetable handling and packaging
- Ecological agriculture producers

Other Actors

Public Administration

- Balearic Department of Agricultural Ecologic Production (CBPAE)
- Balearic Department of Agriculture, Fishing and Rural Environment
- Balearic Council of Ecologic Agricultural Production

Foundations

- Mallorca Preservation Foundation
- **Fundació BIT**

Universities

University of the Balearic Islands

- Research Group on Agrofood Engineering
- Research group on Agrofood Engineering and agricultural systems sustainability

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SOURCES: Dades estadístiques de la producció agrària ecològica Illes Balears, 2022, EAE, acessible at: http://www.cbpae.org/files/EAE_2022.pdf. Consultation with institutional partners of the consortium.

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Technological and Research Centres

Agrifood

- Research and Teaching Institute on Agrofood and Fishing of the Balearic Islands

Environment and Biology

- Environmental Biology Laboratory (University of the Balearic Islands)

Clusters and Associations

- Association of Ecological Production of Mallorca (APAEMA)
- Biomedical and Biotechnological cluster of the Balearic Islands (BIOB)
- Cluster for the Ecological Transition of the Balearic Islands (TEIB)
- Agrofood Cooperatives of the Balearic Islands
- Agromallorca
- Sant Joan Agriculture Association
- Livestock and Agriculture Association of Petra
- INCA Coop Farm Association
- Arta Coopertive
- AUBA Wine Cooperative
- EcoIlla
- Nuts Producers of Mallorca Cooperative
- Andratx Agricultural Cooperative
- Son Bora SAT
- SCL Alpira d'Algaida
- Field Cooperative of Formentera
- SCL Santa Eulàlia
- Tramuntana Viva
- Bessoner Cooperative
- Norma S Microcoop
- Son Jovier SAT
- Som Pagesos
- ABA
- SON Cos S Cooperative
- Coniga SCL
- San Bartomeu Agricultural Cooperative
- Sant Martí Agricultural Cooperative
- SCL Agrícola Murense
- Fruita Bona SAT
- Farmer Cooperative of Inca S Coop
- Farmer Cooperative of Sóller
- SA Cooperative of the Mallorca FieldsAgricultural Cooperative of Sant Antoni, Eivissa
- AgroEivissa
- Chemical IndustryCluster (QLIQIB)
- Ecofeixes
- **Terracor**

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SOURCES: Dades estadístiques de la producció agrària ecològica Illes Balears, 2022, EAE, acessible at: http://www.cbpae.org/files/EAE_2022.pdf. Consultation with institutional partners of the consortium.

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Circular Economy challenges in the Agrifood sector in the Balearic Islands

SOLUTION FOR CIRCULAR ECONOMY MODELS

ECODESIGN:

- For agrifood products intended to be sustainable and to have a long life cycle
- Made of materials which can be reused, recycled and/or biodegradable

AWARENESS-RAISING AND PROMOTION

- Awareness-raising and promotion of the difference in quality of agricultural and food products when implementing circular economy solutions
- Emphasizing the different properties, nutrition and quality of agrifood products from the fields
- Taking the views of farmers into account

KNOWLEDGE ON APPLICABLE LEGISLATION

LACK OF AWARENESS AND PREDICTIONS on the applicable EU, national and regional legislation:

- Intellectual Property Rights legislation applicable to circular economy solutions
- Health and hygiene regulations on reusable packaging and food containers
- The future of the EU legislative framework
- The future of the applicable national and regional legislation regarding circular economy in the agrifood sector and water

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SOURCES: Consultation with consortium SMEs

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Circular Economy Solutions in the Agrifood Sector in the Balearic Islands

BIODEGRADABLE PLASTIC IN ECOLOGICAL FARMS

Substitution of normal plastic materials with biodegradable plastics in ecological farms

KITCHEN WASTE INTO ECOLOGICAL COMPOST

Pilot project for the conversion of kitchen waste from hotels into ecological compos

PHITOSANITARY WARNING STATIONS

System for the analysis of soil humidity and other qualities in agricultural plantations

PASTURE+

Livestock products that restore natural capital, mitigate climate change and promote rural development

ECO CAROBS IN PRODUCTION

A direct and attainable plant-based option to member agricultural businesses to graft their carobs

NOTE: This is an overview of some of the sustainable and circular economy solutions that actors in the agrifood sector are developing, or which can be applied to this sector

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SOURCES: Actor and solution websites; Consultations with SMEs and partners

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Circular Economy and Sustainable solutions for Agrifood in the Mediterranean

Circular Economy Solutions in the Agrifood Sector in the Balearic Islands

Water Treatment Systems	Plastic Free Balearics
Water recuperation and treatment equipment systems	Working with companies to reduce their single-use plastics and finding sustainable solutions
Smart aeroponic growing systems	**Ploutos H2020**
Aeroponic growing systems for resource optimization, maximization of the production and reduction of the environmental impact	Creating more environmentally, socially and economically sustainable opportunities in the agrifood sector

NOTE: This is an overview of some of the sustainable and circular economy solutions that actors in the agrifood sector are developing, or which can be applied to this sector

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SOURCES: Actor and solution websites; Consultations with SMEs and partners

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BIODEGRADABLE PLASTIC IN ECOLOGICAL FARMS

Balearic Islands

CESAM Areas

Packaging
Waste reduction

Challenges

Industrial transition to the circular economy; Sustainability of food production systems; Climate change mitigation and adaptation

SDGs impact

Objective / Challenge

Substitution of normal plastic materials with biodegradable plastics in ecological farms

Environmental impacts and benefits addressed

- ✓ Plastic use reduction
- ✓ Waste reduction
- ✓ Economic effectiveness for the producers reached

Solution's description

- ✓ Substitution of normal plastic with biodegradable plastics in the ecological farms. This project reached 21 ecological agriculture producers in Mallorca
- ✓ Substitution of plastic used to cover plants for biodegradable plastic in the last 4 years (from 2019).
- ✓ Covering the exceeding cost this plastic had in comparison with conventional plastic, to ensure the economic effectiveness of this project
- ✓ Prevention of the installation of plastic-based films with the substitution of biodegradable biofilm with no transgenics

KPIs

- 21 producers reached
- More than 548 km of plastic installation prevented
- Substitution with 10.293 kg of biodegradable biofilm with no transgenics

Partners

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KITCHEN WASTE INTO ECOLOGICAL COMPOST

Balearic Islands

CESAM Areas

Waste reduction
Byproduct valorisation

Challenges

Industrial transition to the circular economy; Sustainability of food production systems; Climate change mitigation and adaptation

SDGs impact

Objective / Challenge

Pilot project for the conversion of kitchen waste from hotels into ecological compos

Environmental impacts and benefits addressed

- ✓ Waste reduction
- ✓ Reuse of hotel kitchen waste
- ✓ Fabrication of value-added compost used in agriculture

Solution's description

- ✓ Conversion of kitchen waste from hotels into ecological compost.
- ✓ Composting an amount of tons of waste from the Playa garden hotel kitchen with an additional compostable material (garden waste)
- ✓ Fabrication of a compost which can be used in ecological agriculture

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KPIs

- X tons of waste used
- X tons of compost fabricated

Partners

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PHYTOSANITARY WARNING STATIONS

Balearic Islands

CESAM Areas

Waste reduction
Water recycling

Challenges

Industrial transition to the circular economy; Sustainability of food production systems; Climate change mitigation and adaptation

SDGs impact

Objective / Challenge

System for the analysis of soil humidity and other qualities in agricultural plantations

Environmental impacts and benefits addressed

- ✓ Effective use of water
- ✓ Effective use of agricultural resources
- ✓ Ensuring the plant health and quality

Solution's description

- ✓ Prevention of plagues and illnesses and effective use of resources in ecological farms
- ✓ Technological advance which allows agricultural businesses to act in advance and take preventative measures regarding possible plagues or illnesses in their plantations
- ✓ System for the analysis of soil humidity and other qualities, which facilitates precise information on the water needs in plantations at all times.

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KPIs

- Water waste reduced
- Hectares protected against plagues or illnesses

Partners

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PASTURE+

Balearic Islands

CESAM Areas

Waste reduction
Byproduct valorisation

Challenges

Regeneration of natural capital in terrestrial ecosystems; Sustainability of food production systems; Climate change mitigation and adaptation

SDGs impact

Objective / Challenge

Livestock products that restore natural capital, mitigate climate change and promote rural development

Environmental impacts and benefits addressed

- ✓ Social and environmental responsibility
- ✓ Good practices
- ✓ Restorage of capital and rural development
- ✓ Climate mitigation

Solution's description

- ✓ State project for holistic animal management to improve the economic, social and environmental viability of organic livestock farms
- ✓ Good agro-livestock practices that contribute to restoring natural capital, mitigating climate change and promoting rural development will be implemented and monitored during 3 years
- ✓ Favoring the placing on the market of products of differentiated quality. Implementation and monitoring of agricultural good practices in animal pastures.

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KPIs

- Results monitored on implementation
- Agro-livestock good practices

Partners

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ECO CAROBS IN PRODUCTION

Balearic Islands

CESAM Areas

Waste reduction
Byproduct valorisation

Challenges

Access to water, sanitation, water treatment and efficient use of water resources; Sustainability of food production systems; Climate change mitigation and adaptation

SDGs impact

Objective / Challenge

A direct and attainable plant-based option to member agricultural businesses to graft their carobs

Environmental impacts and benefits addressed

- ✓ Reduction of plastic use
- ✓ Quality and health of plants
- ✓ Sustainable agricultural practices

Solution's description

- ✓ A direct and attainable option to member agricultural businesses to graft their carobs
- ✓ Finding suitable plant material and make it available to owners with ungrafted carob trees, which can grow in the dry season

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KPIs

- 1450 carobs grafted

Partners

Water Treatment Systems

magic

Balearic Islands

CESAM Areas

Water recycling
Waste reduction

Challenges

Access to water, sanitation, water treatment and efficient use of water resources; Sustainability of food production systems; Climate change mitigation and adaptation

SDGs impact

Objective / Challenge

Water recuperation and treatment equipment systems

Environmental impacts and benefits addressed

- ✓ Reduction of water waste
- ✓ Use of circular economy systems
- ✓ Water recycling and reuse
- ✓ Responding to climate change effects

Solution's description

- ✓ The MA-CONTAINER is one of the water treatment systems of Magic Boats
- ✓ It is an industrial equipment system set on a platform which can contain from 80 to 5.000 m3 per day, and can treat entry salinities of up to 15.000 PPM
- ✓ Equipment systems of the highest water production provided for modules of 5.000 m3 per day
- ✓ Designed to provide a high percentage of water recuperation and a low energy consumption
- ✓ Systems designed according to the facilities' needs

KPIs

- Salinities of up to 15.000 PPM
- 5.000 m3 of water produced per day

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Plastic Free Balearics

Balearic Islands

CESAM Areas

Packaging
Waste reduction

Challenges

Industrial transition to the circular economy; Sustainability of food production systems; Climate change mitigation and adaptation

SDGs impact

Objective / Challenge

Working with companies to reduce their single-use plastics and finding sustainable solutions

Environmental impacts and benefits addressed

- ✓ Reduction of plastic waste
- ✓ Use of circular and sustainable alternative solutions

Solution's description

- ✓ This projects works for the reduction of single-use plastic waste generation in companies, while facilitating the transition towards sustainable practices and striving towards freeing the Balearic Islands of sole use plastic-free
- ✓ Conducting evaluations and personalised reports for plastic reduction. Analysis of annual plastic use in company facilities and sole use plastic products
- ✓ Creating a certification standard for single-use plastic reduction (named Plastic Free Balearics)
- ✓ Creating a Best Practices Guide together with Flutouris for companies in the tourism sector

KPIs

- 45 companies, 12.000 common-use plastic products analyzed

Partners/ Members

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Smart aeroponic growing systems

PHOENIX3D

Balearic Islands

CESAM Areas

Water recycling
Waste reduction

Challenges

Access to water, sanitation, water treatment and efficient use of water resources; Sustainability of food production systems; Climate change mitigation and adaptation

SDGs impact

Objective / Challenge

Aeroponic growing systems for resource optimization, maximization of the production and reduction of the environmental impact

Environmental impacts and benefits addressed

- ✓ Water saving and optimisation
- ✓ Reduction of fertilizers used, free from plant illnesses
- ✓ Optimization of the use of inputs and space

Solution's description

- ✓ Aeroponic systems for plant growing which enable resource optimization, maximization of production and a reduction of the environmental impact
- ✓ A vertical agriculture solution which enables the reduction of the space necessary to be used, and an elimination of the needed land (as the expansion of roots)
- ✓ Combining agriculture and technology to redefine agricultural production limits

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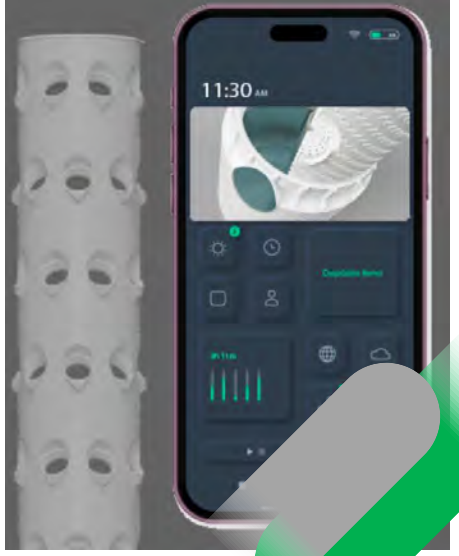

KPIs

- Up to 95% of water saving
- Up to 90% of fertilizer use reduction
- Clean and illness-free
- Space optimization

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Ploutos H2020

Balearic Islands

CESAM Areas

Water recycling
Byproduct valorisation
Waste reduction

Challenges

Access to water, sanitation, water treatment and efficient use of water resources; Industrial transition to the circular economy; Sustainability of food production systems; Climate change mitigation and adaptation

SDGs impact

Objective / Challenge

Creating more environmentally, socially and economically sustainable opportunities in the agrifood sector

Environmental impacts and benefits addressed

- ✓ Economic development
- ✓ Social development
- ✓ Environmental impact mitigation

Solution's description

- ✓ Creating opportunities for changes that can rebalance the value chain in the agrifood system towards a more environmentally, socially and economically sustainable system
- ✓ Ploutos Innovation Academy provides a structure for identification of opportunities, the promotion of behavioral innovation, the development of new business models, raising awareness of data driven technologies and establishment of partnerships across the value chain
- ✓ The 11 sustainable innovation Pilots focus on innovation implementation and co-design, pilot, validation and assessment of the approaches against their economic, environmental and social performance along the agrifood sector

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KPIs

- Results of the 11 pilots
- Opportunities identified
- New business models
- Partnerships created

Partners

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Solutions by CESAM Areas

CESAM Areas	Companies	Solutions
WATER RECYCLING	apaema Associació Producció Agrària Ecològica Mallorca	PHYTOSANITARY WARNING STATIONS
	MAGIC	WATER TREATMENT SYSTEMS

Solutions by CESAM Areas

CESAM Areas	Companies	Solutions
WATER RECYCLING	PHOENIX3D	SMART AEROPONIC GROWING SYSTEMS
		PLOUTOS H2020

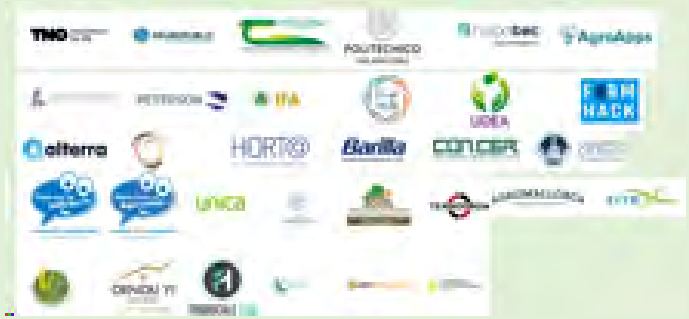
Solutions by CESAM Areas

CESAM Areas	Companies	Solutions
PACKAGING	apaema Associació Producció Agrària Ecològica Mallorca	BIODEGRADABLE PLASTIC IN ECOLOGICAL FARMS
	SAVE THE MED FOUNDATION	PLASTIC FREE BALEARICS

Solutions by CESAM Areas

CESAM Areas	Companies	Solutions
WASTE REDUCTION	apaema Associació Producció Agrària Ecològica Mallorca	BIODEGRADABLE PLASTIC IN ECOLOGICAL FARMS KITCHEN WASTE INTO ECOLOGICAL COMPOST PASTURE+ PHYTOSANITARY WARNING STATIONS ECO CAROBS IN PRODUCTION

Solutions by CESAM Areas

CESAM Areas	Companies	Solutions
WASTE REDUCTION	SAVE THE MED FOUNDATION	PLASTIC FREE BALEARICS
	PHOENIX3D	SMART AEROPONIC GROWING SYSTEMS
		PLOUTOS H2020

Solutions by CESAM Areas

CESAM Areas	Companies	Solutions
BYPRODUCT VALORISATION	apaema Associació Producció Agrària Ecològica Mallorca	KITCHEN WASTE INTO ECOLOGICAL COMPOST
		PASTURE+
		ECO CAROBS IN PRODUCTION
	MAGIC	WATER TREATMENT SYSTEMS
		PLOUTOS H2020

The Agrifood Sector in Occitania

1st sector in the industry of Occitania

23.6 billion € turnover (2015)

9.141 companies

At least **85%** of companies are **SMEs**

4 billion € of exports

49.049 employees

21% of Occitania's workforce

SOURCES: Region Occitanie, L'alimentation: Grande Cause Régionale, 2018, available at: https://www.laregion.fr/L-alimentation-grande-cause-regionale; Carif Oref Occitanie, Les Industries agroalimentaires, 2023, available at: https://www.cariforefoccitanie.fr/territoires-secteurs-et-metiers/sinformer-sur-les-metiers-et-les-secteurs-dactivite/iaa/ ; CCI Occitanie, L'industrie Agroalimentaire a sa feulle de route, 2022, available at https://www.occitanie.cci.fr/actualite/lindustrie-agroalimentaire-sa-feuille-de-route; PEP, L'économie agrícolae en Occitanie, 2023, available at: https://gard.chambre-agriculture.fr/fileadmin/user_upload/National/FAL_commun/publications/Occitanie/Gerer_exploitation/Note_economieeagricole__crao_2023.pdf; DRAAF Occitanie, Mémento de la statistique agricole d'Occitanie, 2023, available at: https://gard.chambre-agriculture.fr/fileadmin/user_upload/National/FAL_commun/publications/Occitanie/Gerer_exploitation/Note_economieeagricole__crao_2023.pdf

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Related Sectors in Occitania

Water

Important water resources (Pyrenees)

Energy

2nd largest region in France in installed photovoltaic capacity

Solid, liquid and gas biomass is also relevant

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SOURCES: La Région Occitanie, La Transition écologique et énergétique en Occitanie, 2023, available at: https://www.laregion.fr/-Energie-en-Occitanie-#:~:text=L'Occitanie%20est%20la%20deuxi%C3%A8me,Pyr%C3%A9n%C3%A9es%20et%20au%20massif%20Central

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Circular Economy and Sustainable solutions for Agrifood in the Mediterranean

Circular Economy in the Agrifood Sector in Occitania

Demand Companies

Agrifood

- Primary sector suppliers
- Bulk suppliers
- Artisanal commerce
- Food processing and additives
- Pre-cooked foods and drinks manufacturers
- Food and health supplements
- Food products manufacturers (bakery and milk products especially)

Chemistry and water

- Water treatment and reuse
- Water treatment equipment fabrication

Packaging and plastic

- Packaging and packaging usage

Supply Companies (B2B)

Circular design

- Consulting/engineering to redefine business/specific products or services related to circular economy; suppliers of renewable energies and technologies, related systems/installations; resource consumption minimisation technologies; materials/products for the circular economy; suppliers of new materials which can be recycled/repurposed; secondary materials/byproducts suppliers; suppliers of products for the circular economy using secondary raw materials (e.g. **Asclepios**)
- Fabrication of reusable containers, manufacturers of machinery for reusable container dispensation (e.g. **NewTimes**)

Value recovery

- Recycling and material recovery; energy recovery; consulting and engineering for recovery solutions/reuse of water; technologies; equipment and installations for material recovery/water reuse

Universities

- Montpellier University (UMR) (IATE, EPOP, QualiSud)
- Nimes University (UNIMES)
- National Superior School of Agronomics of Tolouse (ENSAT)
- National School of Agricultural Education Training (ENSFEA

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SOURCES: https://draaf.occitanie.agriculture.gouv.fr/l-agroalimentaire-d-occitanie-un-role-strategique-pour-valoriser-les-produits-a5046.html; Consultation with AgriSudOuest and AD'OCC; https://agrisudouestinnovation.odoo.com/members/region/occitanie-mp-09-12-31-32-46-65-81-82-23, https://agrisudouestinnovation.odoo.com/members/region/occitanie-lr-11-30-34-48-66-22

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Circular Economy and Sustainable solutions for Agrifood in the Mediterranean

Circular Economy in the Agrifood Sector in Occitania

Technological and Research Centres

Packaging

- Centre Technique de la Conservation des Produits Agricoles (CTCPA)
- CATAR-CRITT Agroresources
- Bioplast (EU Interreg Project)
- UMR IATE

Water

- Plate-Forme Technologique Occitanie (PFT H2O)
- UMR G-EAU (Montpellier University)
- UNESCO Centre for Water, ICIREWARD (UMR)

Waste and Byproduct Valorisation

- UMR IATE
- CATAR Agroresources
- 3BCAR

Soils and Ecosystems Regeneration, Ecology

- Valorhiz
- Laboratoire Recherche en Sciences Végétales (UMR, LRSV)

Biotechnology

- AxLR, SAAT Occitania Mediterranean
- Tolouse Biotechnology Institute (TBI) – National Institute of Applied Sciences (INSA)
- Centre National de Recherche Scientifique (CNRS, Delegation Occitanie Est)
- National centre for genomical plant resources, INRA
- National scientific research centre, CNRS
- AGIR CRT, Technological Research Unit

Agriculture and Agrifood

- Valorhiz
- Nyséos
- Centre National de Ressources Génomiques Végetales (CNRGV)
- Institut Français de la Vigne et du Vin (IFVV – Siège)
- Institut de L'elevage (IDELE) Montpellier
- Institut National de Recherche Agronomique (INRAE, Centre Occitanie-Tolouse, et Montpellier)
- Centre Technique Interprofessionel des Fruits et Legumes (CTIFL, Balandran)
- Institut de L'elevage (IDELE) Montpellier
- Centre de Coopération Internationale de Recherche Agronomique pour le Développement (CIRAD)
- L'Institut agro Montpellier
- Institut de Recherche pour le Developpement de Montpellier (IRD MRS)
- Centre Technique Interprofessionnel des fruits et legumes (CTIFL, Balandran)
- Centre d'experimentation fruits et Légumes (CEFEL)
- Innovations Technologies Formations Conseils (ITFC)
- Agricultural Technique Institute, ARVALIS

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SOURCES: L'agroalimentaire d'Occitanie : un rôle stratégique pour valoriser les produits agricoles, DRAAF Occitanie, October 2018, available at: https://draaf.occitanie.agriculture.gouv.fr/l-agroalimentaire-d-occitanie-un-role-strategique-pour-valoriser-les-produits-a5046.html; Consultation with AgriSudOuest Innovation and AD'OCC; Members, AgriSudOuest Innovation, 2022, available at: https://agrisudouestinnovation.odoo.com/members/region/occitanie-mp-09-12-31-32-46-65-81-82-23, https://agrisudouestinnovation.odoo.com/members/region/occitanie-lr-11-30-34-48-66-22

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Circular Economy and Sustainable solutions for Agrifood in the Mediterranean

Circular Economy in the Agrifood Sector in Occitania

Public Administration and Agencies

- **Economic Development Agency (AD'OCC)**
- Montpellier Mediterranean Metropole
- Nîmes Metropole
- Agence de l'Eau Adour-Garonne
- Conseil Départamental du Tarn
- DRAAF Occitanie, Regional Direction of Agriculture, Food and Forests
- Veolia Eau
- ADEME (Agency for the Ecological Transition)
- Chamber of Commerce and Industry of Aveyron (CCI)
- Regional Chamber of Agriculture, Occitania
- Water Agency of Adour-Garonne

Clusters and Associations

- Agropolis International
- Area Occitanie (Association des Entreprises Alimentaires)
- CER France Lozère
- Cefrance Costieres Camargue
- Chambre de Commerce et d'Industrie de Tolouse (31)
- Chambre Regionale d'Agriculture Occitanie
- Comité National Brebis Laitières
- Castres-Mazamet Technopole
- Communauté d'Agglomération du Sicoval
- CCI Occitanie
- La Coopération Agricole Occitanie (COOP)
- CER France Occitanie
- Castres-Mazamet Technopole
- Chaire Eau Agriculture, Changement Climatique
- VINSEO
- CAPEL Agri-food Cooperative
- **AgrisudOuest**

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SOURCES: L'agroalimentaire d'Occitanie : un rôle stratégique pour valoriser les produits agricoles, DRAAF Occitanie, October 2018, available at: https://draaf.occitanie.agriculture.gouv.fr/l-agroalimentaire-d-occitanie-un-role-strategique-pour-valoriser-les-produits-a5046.html; Consultation with AgriSudOuest Innovation and AD'OCC; Members, AgriSudOuest Innovation, 2022, available at: https://agrisudouestinnovation.odoo.com/members/region/occitanie-mp-09-12-31-32-46-65-81-82-23, https://agrisudouestinnovation.odoo.com/members/region/occitanie-lr-11-30-34-48-66-22

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Circular Economy and Sustainable solutions for Agrifood in the Mediterranean

Circular Economy challenges in the Agrifood sector in Occitania

INNNOVATION AND TECHNOLOGY

WATER REUSE AND RECYCLING:

- Water treatment and reuse within the water cycle in industrial processes
- Recycling sludge resulting from water treatments
- Regeneration solutions (biotechnology and regenerative agriculture) applications in the agrifood sector

INNOVATION AND TECHNOLOGY for new **biomaterials** from agricultural **sub-products**

Technology to facilitate **CIRCULAR PROCESSES** in agroindustry:

- Tracking the origins and final destination of food products and their packaging
- Carbon footprint calculation of products on the market and their packaging
- Facilitating this information to customers in product packaging

KNOWLEDGE ON APPLICABLE LEGISLATION

LACK OF AWARENESS AND PREDICTIONS on the applicable EU, national and regional legislation:

- Intellectual Property Rights legislation applicable to circular economy solutions
- Health and hygiene regulations on reusable packaging and food containers
- The future of the EU legislative framework
- The future of the applicable national and regional legislation regarding circular economy in the agrifood sector and water

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SOURCES: Consultation with consortium SMEs

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Circular Economy challenges in the Agrifood sector in Occitania

SOLUTION FOR CIRCULAR ECONOMY MODELS

ECODESIGN:

- For agrifood products intended to be sustainable and to have a long life cycle
- Made of materials which can be reused, recycled and/or biodegradable

FINANCIAL SUPPORT

- Knowledge on the applicable financial instruments
- Especially for supporting circular economy solutions in the agrifood sector
- Both private and public

AWARENESS-RAISING AND PROMOTION

- Awareness-raising and promotion of the difference in quality of agricultural and food products when implementing circular economy solutions
- Emphasizing the different properties, nutrition and quality of agrifood products from the fields
- Taking the views of farmers into account

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SOURCES: Consultation with consortium SMEs)

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Circular Economy Solutions in the Agrifood Sector in Occitania

Optimiste	Mushrooms for plant health
Optimisation of irrigation technology in adaptation to the effects of climate change	Valorisation of mushrooms for plant health and soil improvement
ECOCLIMASOL	**Agri Wave**
Digital climate management solution to decrease climate risks	Management software for the agrifood sector
Life Zeus ZLD Water Reuse	**Pimp Up**
Advanced water reuse solution for beverage and food industries	Online platform for the sale of non-sold agrifood products

NOTE: This is an overview of some of the sustainable and circular economy solutions that actors in the agrifood sector are developing, or which can be applied to this sector

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SOURCES: Actor and project websites; Consultations with SMEs and partners

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Circular Economy Solutions in the Agrifood Sector in Occitania

Food Pilot	Le JustePack
A digital solution to measure the environmental impact of agrifood products	Sustainable packaging that responds to companies' ecological needs
Vegemat	**Sustainable food packaging**
100% biodegradable, bio-sourced, compostable, vegetal, ecological plastic substitute	Eco-conception of packaging to reduce its environmental impact
PROVALUE	**Green Horizon Biomass**
Promotion and capitalization of waste recovery solutions from the agri-food industry	Valorisation of residual biomass for their fertilizing properties and other uses

NOTE: This is an overview of some of the sustainable and circular economy solutions that actors in the agrifood sector are developing, or which can be applied to this sector

SOURCES: Actor and project websites; Consultations with SMEs and partners

Circular Economy Solutions in the Agrifood Sector in Occitania

Komplantes

Development of Kéfiplante, an innovative product obtained from the fermentation of plant infusions

Agri-food waste valorization solution

Solution for agri-food waste valorisation into compost for local soils

AG'EAU VITAL

A water preparation unit which optimises the efficiency of water in phytosanitary applications

Super absorvent polymer (SAP)

A biosourced and biodegradable super absorbent polymer

Valorisation of wastewater and production residues

Building profitable and secure water reuse loops for wastewater valorisation

Food bulk distribution machine

A food bulk distribution that allows the reuse of containers for 3 products multiple times and reduces polluting packaging use

NOTE: This is an overview of some of the sustainable and circular economy solutions that actors in the agrifood sector are developing, or which can be applied to this sector

SOURCES: Actor and project websites; Consultations with SMEs and partners

BOXILAB

A digitalized solution that treats seeds, plants, fruits and vegetables in a safe and controlled way

NOTE: This is an overview of some of the sustainable and circular economy solutions that actors in the agrifood sector are developing, or which can be applied to this sector

Life Zeus ZLD Water Reuse

CHEMDOC Water Technologies

Occitania

CESAM Areas

Water recycling
Byproduct valorisation
Waste reduction

Challenges

Access to water, sanitation, water treatment and efficient use of water resources; Sustainability of food production systems; Climate change mitigation and adaptation

SDGs impact

Objective / Challenge

Advanced water reuse solution for beverage and food industries

Environmental impacts and benefits addressed

- ✓ Water reuse and waste reduction
- ✓ Adaptation to climate change effects
- ✓ Improving the sustainability of the beverage and food industries

Solution's description

- ✓ An innovative and advanced water reuse solution applied to the beverage and food industries
- ✓ It aims to recover water within the industrial facilities, preventing liquid discharges
- ✓ It does so through the division of waste into 3 recoverable streams: water meeting high sanitary quality standards for food processing; mineral salts for regeneration and cleaning; organic compounds for external anaerobic digestion and energy recovery
- ✓ It provides added-value co-products recovery and net energy gain

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KPIs

- Water reuse and recovery in industrial facilities
- Water waste reduction
- Recovery of added-value co-products
- Net energy gain

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Optimiste

G-EAU
Gestion de l'Eau, Acteurs, Usages
Water matters

Occitania

CESAM Areas

Water recycling

Challenges

Access to water, sanitation, water treatment and efficient use of water resources; Sustainability of food production systems; Climate change mitigation and adaptation

SDGs impact

Objective / Challenge

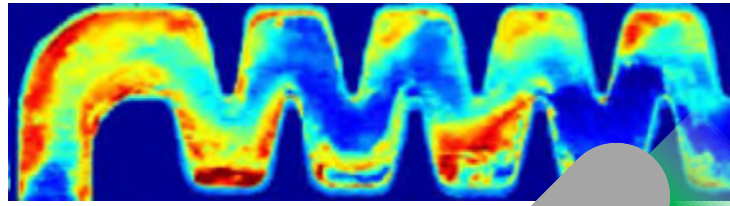
Optimisation of irrigation technology in adaptation to the effects of climate change

Environmental impacts and benefits addressed

- ✓ Optimisation of water use
- ✓ Reduction of water waste
- ✓ Adaptation to climate change effects

Solution's description

- ✓ Optimisation of irrigation technology in adaptation to the effects of climate change
- ✓ Measurement, understanding and modelling of physical and biological processes related to water in agro- and hydro-systems, as well as in irrigation equipment, in transport and distribution infrastructures (management of water pollution) needed to control irrigation
- ✓ Analysis of irrigation efficiency and its environmental impact
- ✓ Optimising the economical use of resources (water, energy and other inputs) in adaptation to climate and societal changes



KPIs

- Quantity and quality of water flows (as a resource and a vector)
- Irrigation efficiency and ecological impacts in different ecosystems and crops

Partners

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Food bulk distribution machine

Occitania

CESAM Areas

Waste reduction
Packaging

Challenges

Access to water, sanitation, water treatment and efficient use of water resources; Sustainability of food production systems; Climate change mitigation and adaptation

SDGs impact

Objective / Challenge

A food bulk distribution that allows the reuse of containers for 3 products multiple times and reduces polluting packaging use

Environmental impacts and benefits addressed

- ✓ Reducing plastic use and packaging waste
- ✓ Reuse of packaging

Solution's description

- ✓ A food bulk distribution machine enables the reuse of containers multiple times, reducing polluting waste and guaranteeing a high level of food safety for the consumer
- ✓ It consists of filling columns which guarantee an exemplary level of cleanliness and complete traceability thanks to robotization and computerization at consumer service
- ✓ The machine enables the automatised distribution of products such as oil, juices and marmalades or similar products (3 per machine)
- ✓ This project is being implemented within the context of CESAM

KPIs

- Polluting plastic reduced
- Number of machines installed
- Quality of the product offered

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BOXILAB

Occitania

CESAM Areas

Waste reduction

Challenges

Access to water, sanitation, water treatment and efficient use of water resources; Sustainability of food production systems; Climate change mitigation and adaptation

SDGs impact

Objective / Challenge

A digitalized solution that treats seeds, plants, fruits and vegetables in a safe and controlled way

Environmental impacts and benefits addressed

- ✓ Waste reduction
- ✓ Adaptation of plant qualities to climate change
- ✓ Plant and seed quality improvement

Solution's description

- ✓ A digitalized solution that treats a wide range of seeds, plants, fruits and vegetables in a safe and controlled way
- ✓ It is modulable and equipped with a fully configurable treatment sequence and knowledge base
- ✓ It is equipped with remote application and Wi-Fi monitoring, which is included to ensure safety distance from UV light
- ✓ The system keeps transability of all treatments and is designed to be used in a laboratory
- ✓ A sustainable and environmentally friendly technical product based on Aclepios Tech's Boxilumix photobiology treatment solution for production, conservation, improvement and food safety

KPIs

- Quality enhanced in treated fruits, vegetables and seeds

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Mycea: Mushrooms for plant health

mycea

Occitania

CESAM Areas

Byproduct valorisation
Waste reduction

Challenges

Regeneration of natural capital in terrestrial ecosystems; Sustainability of food production systems; Climate change mitigation and adaptation

Objective / Challenge

Valorisation of mushrooms for plant health and soil improvement

Environmental impacts and benefits addressed

- ✓ Responding and adapting to the effects of climate change
- ✓ Improving the condition of different ecosystems

Solution's description

- ✓ Biotechnological valorisation of mushrooms through enhancing their organic matter degrading properties for plant production and growth
- ✓ Solution for the improvement of the health of plants and improvement of the condition of soils
- ✓ Targeting health and environmental problems linked to the massive use of chemical inputs in agriculture and green spaces

KPIs

- Improvement of the condition of soils in various ecosystems
- Effectiveness of the valorisation of mushrooms
- Enhancement of plant health and growth (preventing diseases)

SDGs impact

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ECOCLIMASOL

Occitania

CESAM Areas

Waste reduction

Challenges

Regeneration of natural capital in terrestrial ecosystems; Sustainability of food production systems; Climate change mitigation and adaptation

Objective / Challenge

Digital climate management solution to decrease climate risks

Environmental impacts and benefits addressed

- ✓ Responding to the effects of climate change
- ✓ Reduction of agricultural waste
- ✓ Efficient agricultural production
- ✓ Social environmental responsibility

Solution's description

- ✓ Flexible digital and consulting climate management solutions which contribute to decreasing climate risks
- ✓ Aiming to improve social environmental responsibility
- ✓ Democratization of science and technology for a better protection of companies in the agricultural and agricultural insurance sector
- ✓ Its solution enables better and more efficient production, and overcoming hazards resulting from climate change

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KPIs

- Analysis of the climate and its risks
- Health and biodiversity protection
- Increase of ecosystem profitability

Partners

SDGs impact

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Circular Economy and Sustainable solutions for Agrifood in the Mediterranean

Agri Wave

Occitania

CESAM Areas

Waste reduction
Water recycling
Packaging

Challenges

Industrial transition to the circular economy; Sustainability of food production systems; Climate change mitigation and adaptation

SDGs impact

Objective / Challenge

Management software for the agrifood sector

Environmental impacts and benefits addressed

- ✓ Optimisation of resources
- ✓ Traceability of products
- ✓ Production management

Solution's description

- ✓ A management software targeted towards the fruits and vegetables sector
- ✓ It responds to all the internal management needs of a business in the agrifood sector
- ✓ A tool co-built with market players such as wholesalers, fruit and vegetable cooperatives
- ✓ It enables a business to control its sales and purchases, stock planning, traceability of products and production management

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KPIs

- Response to internal management needs
- Responding to the needs of the agrifood sector

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Circular Economy and Sustainable solutions for Agrifood in the Mediterranean

Pimp Up

PimpUp

Occitania

CESAM Areas

Waste reduction
Byproduct valorisation

Challenges

Sustainability of food production systems; Climate change mitigation and adaptation

SDGs impact

Objective / Challenge

Online platform for the sale of non-sold agrifood products

Environmental impacts and benefits addressed

- ✓ Optimisation of sale processes in the agrifood sector
- ✓ Reduction of agrifood waste
- ✓ Valorisation of non-used agrifood products

Solution's description

- ✓ Anti-waste website to help businesses in the agriculture sector
- ✓ This solution provides an online platform for businesses to sell their agricultural products which have not been sold within the classical channels of distribution

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KPIs

- Agrifood waste reduction
- Optimisation of sales and purchases of agrifood products

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Food Pilot

foodpilot

Occitania

CESAM Areas

Waste reduction

Challenges

Industrial transition to the circular economy; Sustainability of food production systems; Climate change mitigation and adaptation

SDGs impact

Objective / Challenge

A digital solution to measure the environmental impact of agrifood products

Environmental impacts and benefits addressed

- ✓ Reduction of agrifood waste
- ✓ CO2 emissions minimisation
- ✓ Improvement of CSR
- ✓ Traceability of agrifood products

Solution's description

- ✓ A digital solution for managing the global food transition
- ✓ It measures the environmental impact of agrifood products
- ✓ It collects CSR data from farms to the end product sold to measure their impact
- ✓ It assists agrifood businesses comply with CSR requirements with real time data

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KPIs

- Agrifood waste reduction
- Real time CSR data collected
- Measurement of agrifood products impact

Partners

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Le JustePack

cartoon
Créateurs de valeurs

Occitania

CESAM Areas

Waste reduction
Packaging

Challenges

Industrial transition to the circular economy; Sustainability of food production systems; Climate change mitigation and adaptation

SDGs impact

Objective / Challenge

Sustainable packaging that responds to companies' ecological needs

Environmental impacts and benefits addressed

- ✓ Responding to the needs of the environment as well as of each brand
- ✓ Compliance with legislative requirements
- ✓ Meeting consumer expectations and guaranteeing recyclable or recycled packaging

Solution's description

- ✓ Addresses the carbon footprint of companies, major ecological and economic issues
- ✓ Rethinking companies' environmental impact through eco-design of packaging and value creation
- ✓ Designing packaging that responds to technical feasibility, market requirements, cost control, and environmental impact
- ✓ This is achieved through a comparative life cycle analysis

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Le JustePack
cartoon

KPIs

- Optimum packaging
- Minimum environmental impact
- Excess of material and waste prevented

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Vegemat

vegeplast

Occitania

CESAM Areas

Waste reduction
Packaging
Byproduct valorisation

Challenges

Industrial transition to the circular economy; Sustainability of food production systems; Climate change mitigation and adaptation

SDGs impact

Objective / Challenge

100% biodegradable, bio-sourced, compostable, vegetal, ecological plastic substitute

Environmental impacts and benefits addressed

- ✓ Waste and pollutant plastic reduction
- ✓ Plastic substitution and alternative materials
- ✓ Valorisation of cereals and other natural components

Solution's description

- ✓ A 100% vegetal and biodegradable material usable in the fabrication of many everyday use products
- ✓ Resistant to heat and cold, sealed and protecting of contained products
- ✓ Solutions for pollutant plastic substitution
- ✓ Bioplastics and biomaterials made from cereals and other natural components
- ✓ Adaptable properties depending on the client's needs

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KPIs

- As resistant as traditional plastic
- Resistant to heat
- High oxygen barrier thanks to a cellulose film
- Resistant to cold
- Large colour variety

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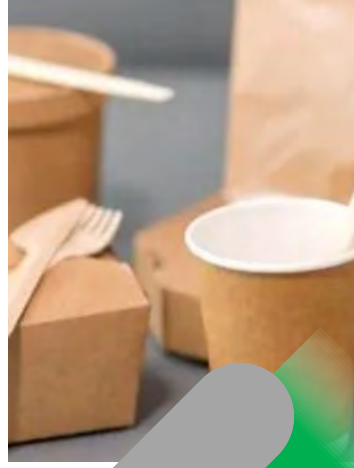
Sustainable food packaging



CTCPA

Occitania

CESAM Areas

Waste reduction
Packaging

Challenges

Industrial transition to the circular economy; Sustainability of food production systems; Climate change mitigation and adaptation

SDGs impact

Objective / Challenge

Eco-conception of packaging to reduce its environmental impact

Environmental impacts and benefits addressed

- ✓ Responding to the needs of the environment as well as of each brand
- ✓ Compliance with legislative requirements
- ✓ Reduction of the environmental impact of packaging

Solution's description

- ✓ Development of eco-conceptions of packaging which effectively reduce the environmental impact
- ✓ Increases the functionality and durability of food packaging, ensuring food quality
- ✓ Use of CTCPA's expertise in packaging materials and food product qualities, to develop solutions that respond to issues along the value chain
- ✓ Developing the eco-conception of packaging and the life-cycle analysis of packaging to find effective solutions

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KPIs

- Eco-conception packaging
- Plastic reduced
- Improvement of food quality preservation

Partners

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PROVALUE

CATAR AGRO RESSOURCES

Occitania

CESAM Areas

Waste reduction
Byproduct valorisation

Challenges

Industrial transition to the circular economy; Sustainability of food production systems; Climate change mitigation and adaptation

SDGs impact

Objective / Challenge

Promotion and capitalization of waste recovery solutions from the agri-food industry

Environmental impacts and benefits addressed

- ✓ Agrifood waste reduction
- ✓ Developing waste recovery solutions for the agrifood sector
- ✓ Valorisation of by-products from the agrifood sector

Solution's description

- ✓ Valorisation of waste recovered from the agrifood sector through:
  - The extraction of fine fractions and their valorisation as additives for food and veterinary industries
  - The treatment of residues for energy recovery
- ✓ Addressing all types of agrifood waste, including meat, fish and dairy. This project expands the technical scope of the VALUE project
- ✓ Providing precise waste recovery solutions, applicable to the agrifood industry
- ✓ Creating a critical mass of innovation in the European area in this technical field, to make it possible to develop more effective solutions

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KPIs

- Agrifood waste reduced
- Energy recovered
- Fractions extracted their valorisation

Partners

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SUDOE Interreg

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Green Horizon Biomass

CATAR AGRO RESSOURCES

Occitania

CESAM Areas

Waste reduction
Byproduct valorisation

Challenges

Industrial transition to the circular economy; Sustainability of food production systems; Climate change mitigation and adaptation

SDGs impact

Objective / Challenge

Valorisation of residual biomass for their fertilizing properties and other uses

Environmental impacts and benefits addressed

- ✓ Waste reduction
- ✓ Reuse of residual biomass
- ✓ Valorisation of residue and co-products

Solution's description

- ✓ Selection of local residual biomass on which to study the pyrolysis process
- ✓ Co-products of pyrolysis such as biochar and bio-oil are studied, respectively, for their fertilizing properties by Agrinutrition, and for the content of high-potential molecules contained in bio-oils

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KPIs

- Local biomass co-products analysed
- Fertilizing properties found through this analysis

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Komplantes

CATAR AGRO RESSOURCES

Occitania

CESAM Areas

Waste reduction
Byproduct valorisation

Challenges

Industrial transition to the circular economy; Sustainability of food production systems; Climate change mitigation and adaptation

SDGs impact

Objective / Challenge

Development of Kéfiplante, an innovative product obtained from the fermentation of plant infusions

Environmental impacts and benefits addressed

- ✓ Valorisation of fermented plant infusions
- ✓ Agrifood waste reduction

Solution's description

- ✓ Development of an original and innovative product obtained from the fermentation of plant infusions: Kéfiplante
- ✓ In partnership with Caribou TG, the CRT CATAR worked to identify the nature of the molecules present in Kéfiplantes
- ✓ It also highlighted the impact of fermentation on metabolites
- ✓ It led to the establishment if correlations between chemical functionality and biological activities
- ✓ It was done through the fractionation of matter and the analysis of molecules to identify the nature of the metabolites specific to Kéfiplantes
- ✓ Identification of primary and secondary metabolites through a set of analytical techniques, among which polyphenols and their glycosylated form were highlighted

KPIs

- Development of Kéfiplante
- Results of the analysis of Kéfiplante molecules
- Primary and secondary metabolites identified

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Agri-food waste valorisation solution

les Alchimistes

Occitania

CESAM Areas

Waste reduction
Packaging

Challenges

Industrial transition to the circular economy; Sustainability of food production systems; Climate change mitigation and adaptation

SDGs impact

Objective / Challenge

Solution for agri-food waste valorisation into compost for local soils

Environmental impacts and benefits addressed

- ✓ Waste management
- ✓ Byproduct valorisation

Solution's description

- ✓ Supporting businesses with the management of their agri-food waste
- ✓ Sorting, collection and local recovery of agri-food bio-waste
- ✓ Collection of full bins and replacement for clean and hygenized bins
- ✓ Diagnosis of the agri-food waste of a business, its volume, related activities and origin, including the technical constraints for waste management
- ✓ The frequency of collection, the number of bins and their location are defined depending on the diagnosis per business
- ✓ Personalised follow-up and information of a business' waste collection and recycling

KPIs

- Tonnes of waste managed per business
- Tonnes of agri-food waste valorised as compost for soils

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AG'EAU VITAL

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CESAM Areas

Water recycling

Challenges

Industrial transition to the circular economy; Sustainability of food production systems; Climate change mitigation and adaptation

SDGs impact

Objective / Challenge

A water preparation unit which optimises the efficiency of water in phytosanitary applications

Environmental impacts and benefits addressed

- ✓ Water use reduction
- ✓ Reduction of chemical products used in agricultural sites
- ✓ Response to the effects of climate change

Solution's description

- ✓ Adaptation of water to the solubility conditions of commercial specialities for the improvement of slurry concentration and effectiveness
- ✓ It achieves the optimisation of the water systems in agricultural sites through adequate spraying, which also effectively reduces the necessary amount of phytosanitary product used
- ✓ Depending on the pressure and application conditions of the water system, a significant reduction can be achieved while maintain the concentration of product in each drop of water

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KPIs

- Between 20 to more than 50% reduction of necessary phytosanitary product
- Can incorporate a second preparation circuit and automatic valves as well as remote control

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Super Absorvent Polymer (SAP)

BIOMANITY

Occitania

CESAM Areas

Waste reduction
Packaging

Challenges

Industrial transition to the circular economy; Sustainability of food production systems; Climate change mitigation and adaptation

SDGs impact

Objective / Challenge

A biosourced and biodegradable super absorbent polymer

Environmental impacts and benefits addressed

- ✓ Water retention and optimisation
- ✓ Biodegradable polymers as fertilizers
- ✓ Responding to climate change through optimized water use

Solution's description

- ✓ Develoment of the first 100% biosourced and biodegradable Super Absorvent Polymer (SAP) for agricultural use
- ✓ It is placed at the roots of plants and acts as a reservoir of water and fertilizer thanks to its functions which allow the control of these two resources
- ✓ It absorbs the water that is not captured by plants during watering and increases the useful water reserve in the soul (crops are more resistant to water stress)
- ✓ It encapsulates fertilizers and resleases them in a controlled manner, it avoids overdoses and leaching, and improves their effectiveness

KPIs

- Water retention from 100 to 1200g of water per 1g of SAP
- Its biodegradability in the soil has been successfully tested through the standardized OECD 301F test

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Valorisation of wastewater and production residues

ecofilae
Reuse water

Occitania

CESAM Areas

Water recycling

Challenges

Industrial transition to the circular economy; Sustainability of food production systems; Climate change mitigation and adaptation

SDGs impact

Objective / Challenge

Building profitable and secure water reuse loops for wastewater valorisation

Environmental impacts and benefits addressed

- ✓ Water reuse and recycling
- ✓ Water waste reduction
- ✓ Waste management

Solution's description

- ✓ Building profitable and secure water reuse loops, a chain of treatment, distribution of control that is adapted to the local situation.
- ✓ Applicable to road washing, irrigation, oil amendment, groundwater and rivers recharge or drinking water
- ✓ Wastewater and production residues as valuable and abundant sources of water and nutrients
- ✓ Freeing these resources to achieve attractive and resilient territories, securing industrial and agricultural production while preserving and restoring water bodies

KPIs

- Safe production of energy crops, irrigation of green areas, clean roads, cool cities, recharge rivers, produce snow or drinking water from wastewater

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Solutions by CESAM Areas

CESAM Areas	Companies	Solutions
WATER RECYCLING	CHEMDOC Water Technologies	Advanced water reuse solution for beverage and food inudstries
	G-EAU Gestion de l'Eau, Acteurs, Usages Water matters	Optimization of irrigation technology in adaptation to the effects of climate change
	Agri Wave	Management software for the agrifood sector
	AG'EAU VITAL	AG'EAU VITAL
	ecofilae Reuse water	Valorization of wastewater and production residues

Solutions by CESAM Areas

CESAM Areas	Companies	Solutions
PACKAGING	AgriWave	Management software for the agrifood sector
	cartoon Créateurs de valeurs	Le JustePack
	vegeplast	Vegemat
	CTCPA	Sustainable food packaging
	les Alchimistes	Agri-food waste valorization solution
	BIOMANITY	Super Absorvent Polymer (SAP)

Solutions by CESAM Areas

CESAM Areas	Companies	Solutions
WASTE REDUCTION	CHEMDOC Water Technologies	Advanced water reuse solution for beverage and food industries
	mycea	Valorization of mushrooms for plant health and soil improvement
	ECOCLIMASOL	Digital climate management solution to decrease climate risks
	Agri Wave	Management software for the agrifood sector
	PimpUp	Online platform for the sale of non-sold agrifood products

Solutions by CESAM Areas

CESAM Areas	Companies	Solutions
WASTE REDUCTION	foodpilot	A digital solution to measure the environmental impact of agrifood products
	Nuntime ingeniería	Food bulk distribution machine
	Asclepios TECH	BOXILAB

Solutions by CESAM Areas

CESAM Areas	Companies	Solutions
WASTE REDUCTION	cartoon Créateurs de valeurs	Le JustePack
	vegeplast	Vegemat
	CTCPA	Sustainable food packaging
	CATAR AGRO RESSOURCES	PROVALUE
		Green Horizon Biomass
		Komplantes
	les Alchimistes	Agri-food waste valorization solution

Solutions by CESAM Areas

CESAM Areas	Companies	Solutions
WASTE REDUCTION	BIOMANITY	Super Absorvent Polymer (SAP)
	Nautimer ingeniuria	Food bulk distribution machine

Solutions by CESAM Areas

CESAM Areas	Companies	Solutions
BYPRODUCT VADLORISATION	CHEMDOC Water Technologies	Advanced water reuse solution for beverage and food inudustries
	mycea	Valorization of mushrooms for plant health and soil improvement
	PimpUp	Online platform for the sale of non-sold agrifood products
	les Alchimistes	Solution for agri-food waste valorisation into compost for local soils
	vegeplast	Vegemat