NOVA PACK

NOVEL ANTIMICROBIAL COATINGS AND PACKAGING IN THE MEDITERRANEAN

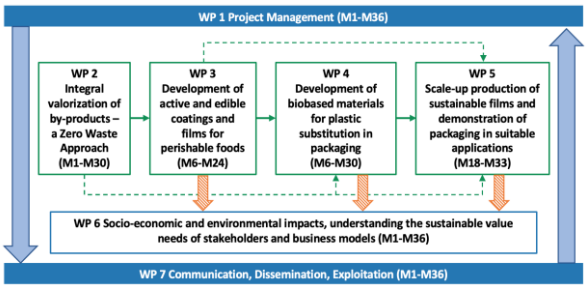
Agri-food Value Chain

Newsletter nº2 November 2025

NOVel Antimicrobial Coatings and PACKaging in the Mediterranean" (NOVAPACK) brings together an interdisciplinary consortium of technology centers, universities, and companies from across the Mediterranean, all united by the goal of promoting innovative and sustainable solutions in the food sector.

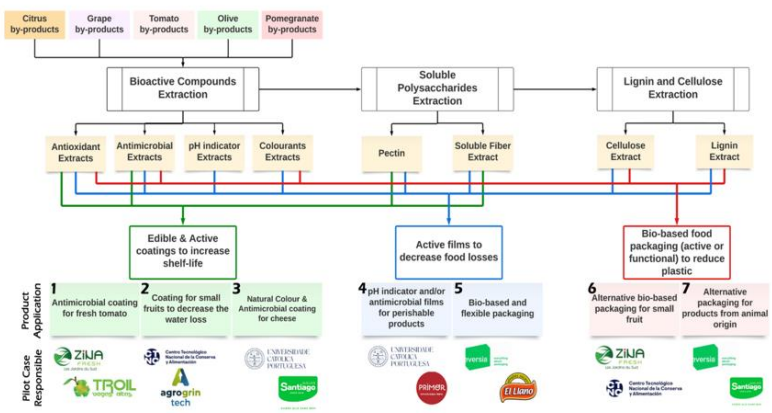
NOVAPACK's main objective is to reduce food waste and minimize the use of petroleum-derived plastics by **developing bioactive and biodegradable antimicrobial coatings, films, and packaging**.

Five technical WP were designed to achieve the project goals



Key exploitable results

These KERs were designed to support **biodegradable, sustainable, and smart food packaging solutions** reducing waste, extending shelf life, and improve safety, aligning with EU priorities in circular economy and food system resilience.



Duration: 1/12/2024 till 30/11/2027

CONSORTIUM

UNIVERSIDADE CATÓLICA PORTUGUESA

Centro Tecnológico Nacional de la Conserva y Alimentación

AIMPLAS

ZiNA FRESH Les Jardins du Sud

eversia everything about packaging

agrogrin tech

UNIVERSITÉ DE GABÈS University of Gabes جامعة قابس

EU FUNDING

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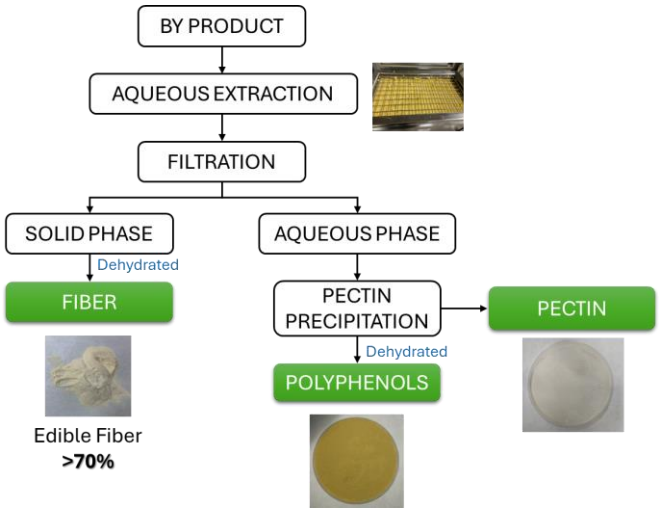
This project is part of the PRIMA Programme supported by the European Union

TECHNICAL ISSUES

Building on the initial characterization of agri-food secondary streams, CTNC has advanced the valorisation of citrus by-products by developing an integrated process to fractionate lemon peel into insoluble fibre, soluble fibre and polyphenols.

This includes pectin extraction by precipitation and parallel recovery of polyphenols, followed by detailed physicochemical and functional characterisation of each extract. Early results indicate a lemon fibre with a high dietary fibre content, which partners such as AIMPLAS are already incorporating into bioplastic formulations to support more sustainable packaging within NOVAPACK.



Flow diagram for obtaining extracts for lemon by-product.

NRC partner has also worked on extracting pectin from various citrus wastes (lemon, orange and mandarin), for which it has used citric acid. And has carried out the determination of the antimicrobial activity of orange and mandarin biofilm.

Pectin extracted from Lemon waste

Pectin extracted from Mandarin waste

Antimicrobial activity of orange and mandarin biofilm

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TECHNICAL ISSUES

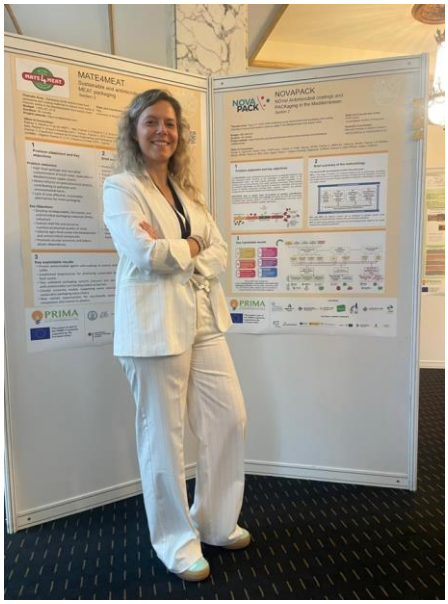
WP4 of NOVAPACK project that recently started and is coordinated by AIMPLAS has the objective to obtain formulations based on pectin derived from diverse types of fruits. AIMPLAS is carrying out and performing experimental tests at the laboratory scale using a Brabender torque rheometer. The formulations are optimized by selecting the appropriate base material (biobased). The experiments being conducted allow for the selection of a formulation that exhibits compatibility between the fibres of different fruits (lemon, tomato and pomegranate that was and will be provided by CTNC and UCP) and the matrix, as well as enabling further processing through blown film extrusion which will be performed in WP5.



Materials obtained through experimental in Brabender torque rheometer

DISSEMINATION ACTIVITIES

Prima Project Day 2025



(1–2 October, Barcelona) NOVAPACK had the opportunity to be showcased alongside other inspiring projects funded by the PRIMA Partnership. This event brought together project coordinators and researchers to exchange ideas, share progress, and explore solutions for more sustainable and resilient Mediterranean agri-food systems.

Our project, NOVAPACK, focuses on:

- Upcycling Mediterranean crops - fruits and vegetables
- Producing biodegradable and smart packaging

Together, we are building stronger synergies for the region's sustainable future.

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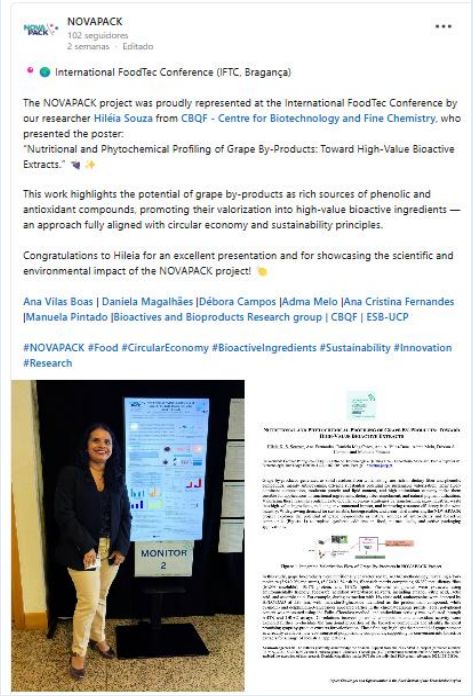
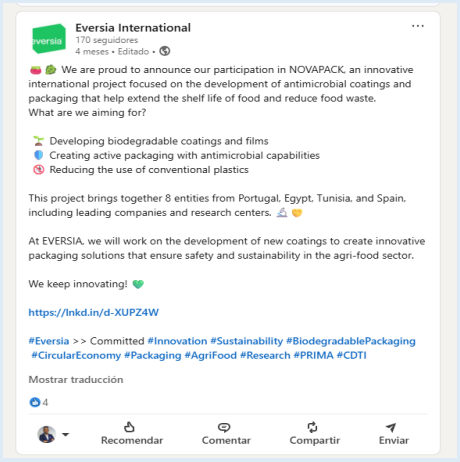
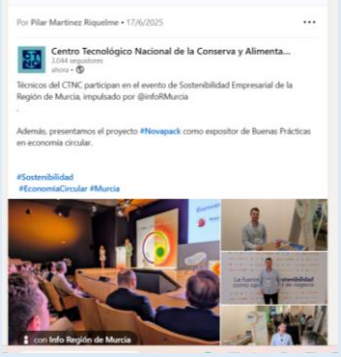
DISSEMINATION ACTIVITIES

NOVAPACK LinkedIn Posts







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DISSEMINATION ACTIVITIES

Oral communications

- From April 11 to 23, 2025, Professor Lazhar Zourgui (Gabes University) presented the NOVOPACK project at an international congress on medicinal plants in Djerba, Tunisia. He presented the objectives of the project and the richness of our bioresources in active biomolecules with very interesting biological activities

- A workshop was held on October 21, 2025, from Gabes Univesity teams, bringing together various stakeholders from the regional socio-economic sector. During the event, a conference entitled “Active Biofilms: When Bioresources Become Packaging” was delivered, highlighting innovative approaches to transform natural and industrial by-products into active materials for sustainable food packaging. The presentation was followed by a lively discussion focusing on strategies for the valorization of industrial co-products, the promotion of circular bioeconomy practices, and the transfer of research outcomes from universities to industrial applications across the Mediterranean region.

- Manuela Pintado (Escola Superior de Biotecnologia, Universidade Católica Portuguesa) presented results from the NOVAPACK project in the session entitled “Obtaining Value-Added Ingredients from Citrus By-Products and Integrating Them into the Agri-Food Chain” during the 6º Balanço de Campanha dos Citrinos event, held on 22 October 2025 in Algarve, Portugal.

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DISSEMINATION ACTIVITIES

Oral communications

- NRC: Participation in the PRIMA Projects Workshop on the WEFE Nexus (1–2 November 2025, Institute of National Planning - Egypt) - WEFE NEXUS projects Inputs contribution, where Prof. Dr. Faten Ibrahim give a presentation about NOVAPACK project.

In the presence of Dr. Omar Amawi, Deputy Director, PRIMA Foundation, NOVAPACK team participated with number of PRIMA projects in the event organized by DIONYSU project.

- On Thursday, November 20, 2025, during a meeting of all Prima project coordinators in Tunisia, Prof. Lazhar Zourgui presented the Prima “Novopack” project, its objectives, its partners, and the different stages of its implementation.

- And, during an event organized on Thursday, November 20, 2025, by the Higher Institute of Applied Biology of Medenine and the Agency for the Promotion of Agricultural Investments (APIA) of Medenine, Professor Nacim Zouari (a member of our team) presented our PRIMA project “NOVOPACK” to young graduates, promising newcomers, and farmers.

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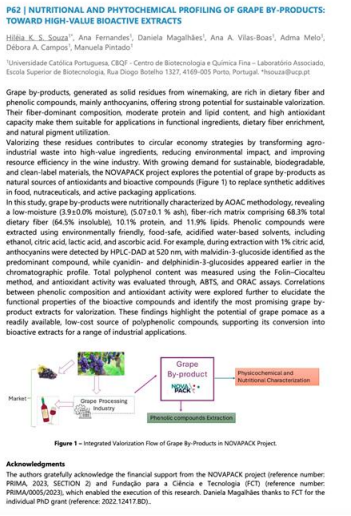
DISSEMINATION ACTIVITIES

Poster communications

- Hiléia K. S. Souza presented a poster entitled “Nutritional and Phytochemical Profiling of Grape By-Products: Toward High-Value Bioactive Extracts” at the International FoodTec Conference, held in Bragança (Portugal) from 27 to 29 October 2025.



P62 | NUTRITIONAL AND PHYTOCHEMICAL PROFILING OF GRAPE BY-PRODUCTS: TOWARD HIGH-VALUE BIOACTIVE EXTRACTS

Hiléia K. S. Souza[1*], Ana Fernandes[1], Daniela Magalhães[1], Ana A. Vilas-Boas[1], Adma Melo[1], Débora A. Campos[1], Manuela Pintado[1]

[1]Universidade Católica Portuguesa, CBQF – Centro de Biotecnologia e Química Fina – Laboratório Associado, Escola Superior de Biotecnologia, Rua Diogo Botelho 1327, 4169-005 Porto, Portugal. *hsouza@ucp.pt

Grape by-products, generated as solid residues from winemaking, are rich in dietary fiber and phenolic compounds, mainly anthocyanins, offering strong potential for sustainable valorization. Their fiber-dominant composition, moderate protein and lipid content, and high antioxidant capacity make them suitable for applications in functional ingredients, dietary fiber enrichment, and natural pigment utilization.

Valorizing these residues contributes to circular economy strategies by transforming agro-industrial waste into high-value ingredients, reducing environmental impact, and improving resource efficiency in the wine industry. With growing demand for sustainable, biodegradable, and clean-label materials, the NOVAPACK project explores the potential of grape by-products as natural sources of antioxidants and bioactive compounds (Figure 1) to replace synthetic additives in food, nutraceuticals, and active packaging applications.

In this study, grape by-products were nutritionally characterized by AOAC methodology, revealing a low-moisture (3.9±0.0% moisture), (5.07±0.1 % ash), fiber-rich matrix comprising 68.3% total dietary fiber (64.5% insoluble), 10.1% protein, and 11.9% lipids. Phenolic compounds were extracted using environmentally friendly, food-safe, acidified water-based solvents, including ethanol, citric acid, lactic acid, and ascorbic acid. For example, during extraction with 1% citric acid, anthocyanins were detected by HPLC-DAD at 520 nm, with malvidin-3-glucoside identified as the predominant compound, while cyanidin- and delphinidin-3-glucosides appeared earlier in the chromatographic profile. Total polyphenol content was measured using the Folin–Ciocalteu method, and antioxidant activity was evaluated through, ABTS, and ORAC assays. Correlations between phenolic composition and antioxidant activity were explored further to elucidate the functional properties of the bioactive compounds and identify the most promising grape by-product extracts for valorization. These findings highlight the potential of grape pomace as a readily available, low-cost source of polyphenolic compounds, supporting its conversion into bioactive extracts for a range of industrial applications.

Figure 1 – Integrated Valorization Flow of Grape By-Products in NOVAPACK Project.

Acknowledgments
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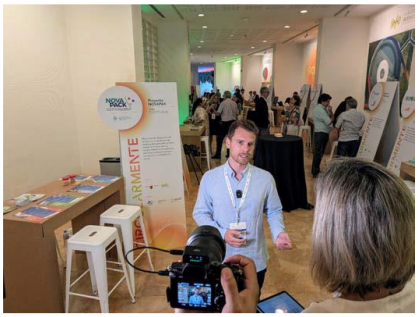
SYNERGY EVENTS

On June 17, 2025, the National Technological Center for Food Preservation and Processing (CTNC) participated as an exhibitor at the CIRCULARMENTE 2025 event, held in Murcia as part of the CircularMente Region of Murcia initiative.



On September 18, 2025, the CTNC was at Farmaforum (Madrid, Spain) to strengthen contacts and acquire new knowledge.

UNIVERSITÀ DEGLI STUDI DI UDINE
Valorisation of biomolecules for food and non-food applications
NETTLE iM-PACK Synergy Event VALO Stones DAIRY+

On November 21, 2025, Eversia has a Space Open to the public to address its perspective on biomolecules as a food packaging manufacturer, highlighting its participation in the PRIMA IM-PACK and NOVAPACK projects.

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Master's thesis defense

❖ On November 8, 2025, Maha, a student from the Faculty of Sciences in Gabes, defended her Master's thesis entitled "Valorization and Characterization of Bioactive Compounds from Collected Waste," under the scientific supervision of Dr. Samir Aydi, a member of our Prima "NOVOPACK" project team.

FSG

République Tunisienne
Ministère de l'Enseignement Supérieur, de la Recherche Scientifique

Université de Gabès
Faculté des sciences de Gabès
Département des sciences de la vie

MEMOIRE

Pour l'obtention du diplôme de Master de recherche
Dans la discipline
Microbiologie, Génétique et bioressources (MRMGB)
Intutilé :

Extraction et caractérisation de composés bioactifs à partir de déchets de récoltes.

Présenté par : **Maha Gammoudi**
Soutenu le 17 /10 /2025
Membres de jury :

Mr. Lazhar ZOURGUI	**Président**
Mme Hana MAALEJ	**Examinatrice**
Mr. Samir AYDI	**Encadrant**

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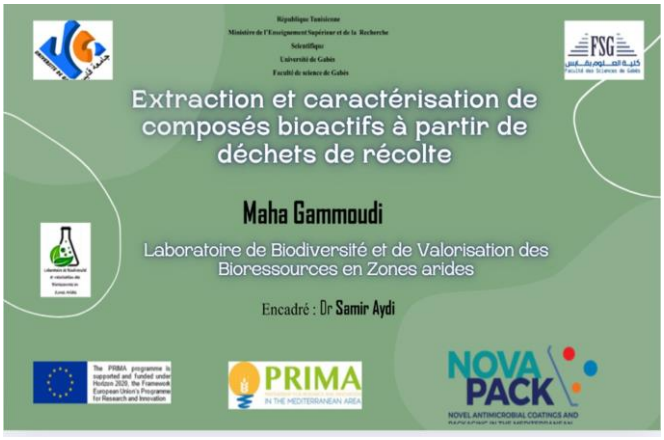

The content of this newsletter represents the view of the CHANGE-UP project only and is its sole responsibility. It does not necessarily reflect the opinion of the European Union.

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More information:

https://cbqf.esb.ucp.pt/projects/novel-antimicrobial-coatings-and-packaging-mediterranean

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