1st International Multidisciplinary Acorn as Food Workshop

ACORN 2024

17-18 DECEMBER 2024

medacornet

Rescuing acorns as a Mediterranean traditional superfood

Pedro Babo
CEO, CSO LandraTech

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PRIMA PARTNERSHIP FOR RESEARCH AND INNOVATION IN THE MEDITERRANEAN AREA
The PRIMA programme is supported under Horizon 2020 the European Union's Framework Programme for Research and Innovation.
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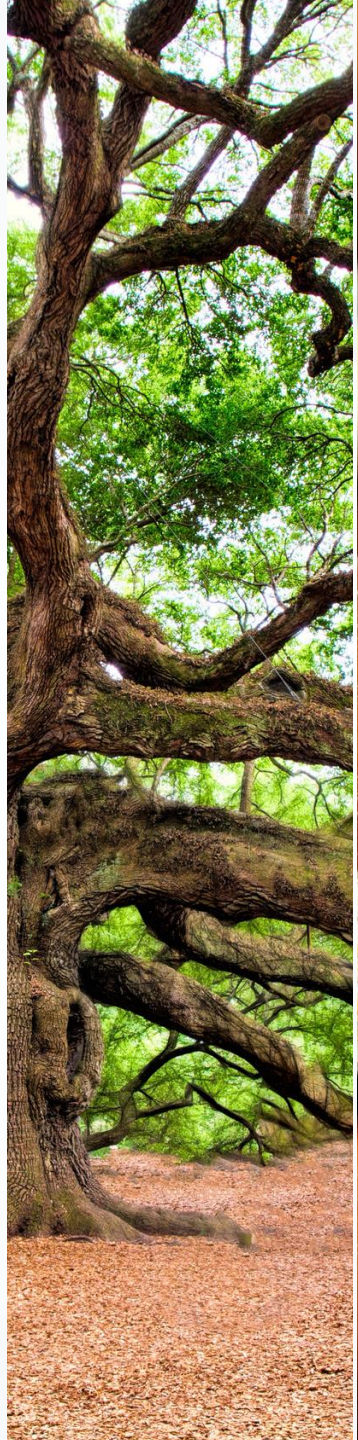
المملكة المغربية وزارة التعليم العالي و البحث العلمي و الإبتكار
CDTI Centro para el Desarrollo Tecnológico Industrial

OUR COMPANY

LandraTech is a Portuguese company founded in October 2020, specializing in the **valorization of acorns from native oak, cork oak and holm oak forests** as a raw material for the food industry.



LANDRATECH
FROM NATURE TO YOU

LANDRA
(regionalism; From Latin "glandem"- bitter acorn)

TECH
(diminutive; From English “Technology”)

SYSTEMATIC PROBLEM

Long Market Chains

- High CO_2 Footprint
- No Food Sovereignty in EU
- High Costs

Environmental Crisis

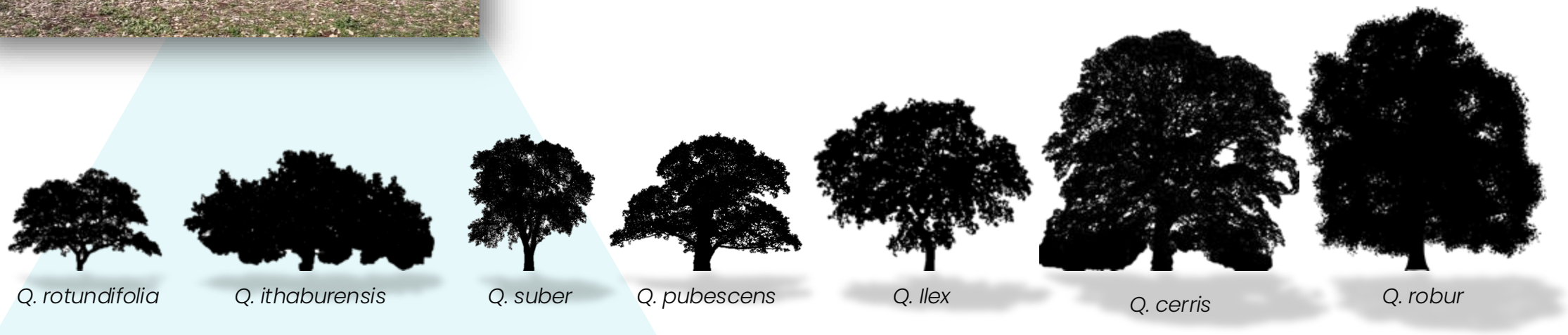
- Climatic Urgency
- 80% Deforestation
- Wildfires High Frequency

- 16,6% world population undernourished
- ≈37% of human-induced GHG emissions

Food Emergency

MEDITERRANEAN OAK FORESTS

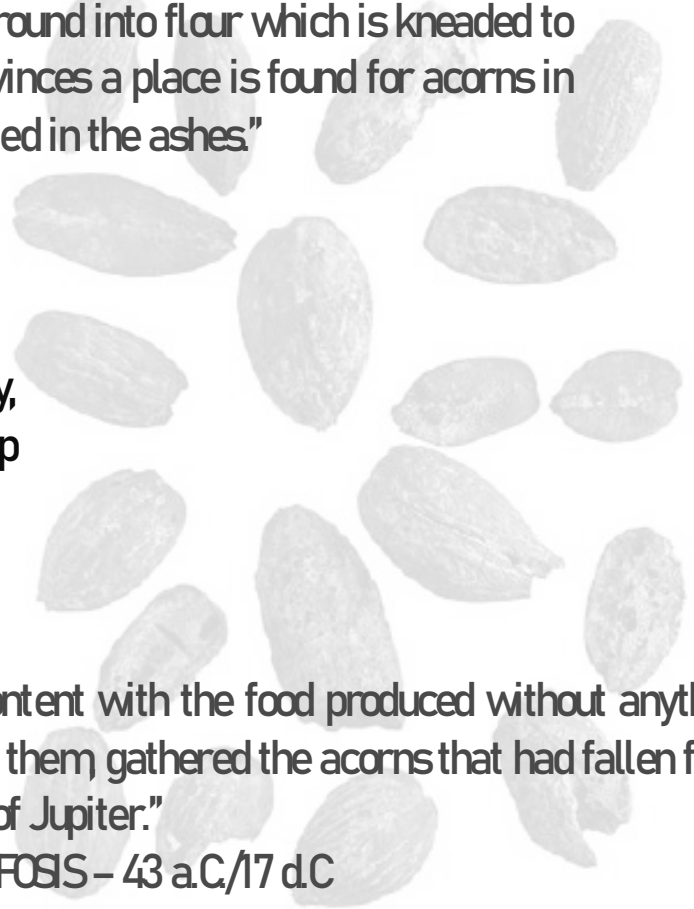
- About 30% of the Mediterranean basin area;
- Responsible for carbon fixation;
- Resilient to climatic changes;
- Produce 250-1600 Kg acorn/ha/year.



ACORNS - FOOD FROM FORESTS

"Acorns at this very day constitute the wealth of many races, even when they are enjoying peace. Moreover also when there is a scarcity of corn they are dried and ground into flour which is kneaded to make bread; beside this, at the present day also in the Spanish provinces a place is found for acorns in the second course at table. Acorns have a sweeter flavor when roasted in the ashes."
PLINY THE ELDER, NATURAL HISTORY, 12-37

"For two-thirds of the year the mountaineers feed on the acorn, which they dry, bruise, and afterwards grind and make into a kind of bread, which may be stored up for a long period."
STRABO, GEOGRAPHY, BOOK III, CHAPTER III



"And the men, content with the food produced without anything being required of them, gathered the acorns that had fallen from the copious tree of Jupiter."
OVIDIO, METAMORFOSIS – 43 a.C./17 d.C

Deforce, et al. 2009 - Bronze age charred acorns

THE OPPORTUNITY

A FOOD FROM THE PAST TO THE FUTURE

… aligned with market demands

Sustainable Production

Without use of watering, fertilizers or phytochemicals.

Reduced Carbon Footprint

"Forest2Fork" short supply chains, from carbon-fixing forests

Healthy Food

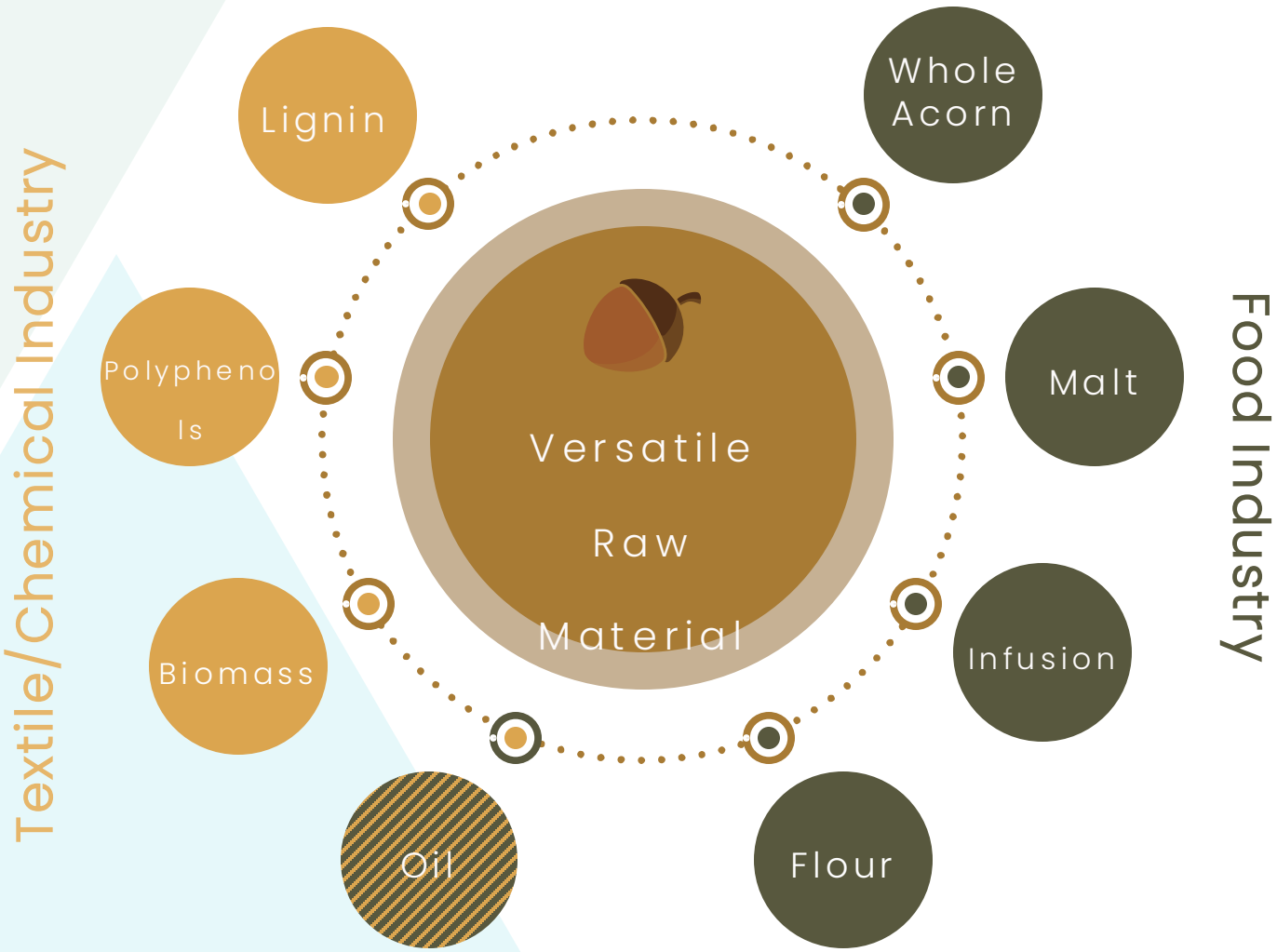
Nutritious food with nutraceutical properties.

Tasty and Versatile Ingredient

87.5% consumers of food and drinks with acorns satisfied.*

*Survey carried out in 2021 to 231 consumers of 8 nationalities spread across 4 countries.

VERSATILE RESOURCE

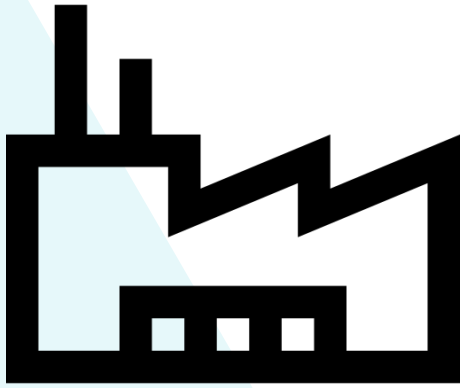


ACORN VALUE CHAIN

HARVESTING

INSIGNIFICANT; MOSTLY MANUAL

PROCESSING



ARTISIANAL PRODUCTION

DISTRIBUTION

LACK OF MARKET CHANNELS

FINAL CONSUMER

UNAWARE OF ACORN'S POTENTIAL

REGULATORY ISSUES

Quercus rotundifolia Lam. Clear

Common Names

Bolota de Azinheira (PT), Sweet acorn (EN)

Description

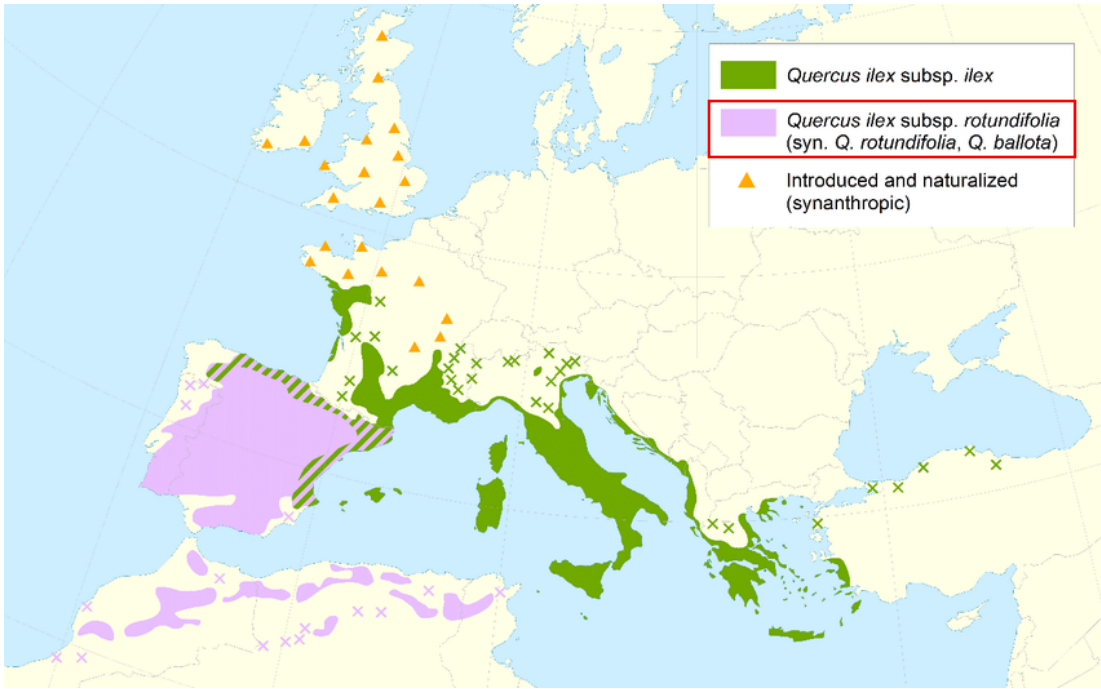
The entry concerns the use of the fruit (acorn) of *Quercus rotundifolia* Lam. It belongs to the plant family *Fagaceae*.

STATUS

- **Fruit (acorn)**

NOT NOVEL IN FOOD - According to the information available to the Member States' competent authorities, this product was used for human consumption to a significant degree within the Union before 15 May 1997. Thus, it is not considered to be 'novel' according to the provisions of the Novel Food Regulation (EU) 2015/2283 and its access to the market is not subject to the pre-market authorisation in accordance with Regulation (EU) 2015/2283.

However, other legislation may restrict the placing on the market of this product as a food in the EU or in some Member States. Therefore, it is recommended to check with the competent authority(ies) of the Member State(s).



Beck PSA, et al. 2020

OUR SOLUTION

MEDiterranean

ACORn

NETwork

medacornet

Rescuing Acorns as a Mediterranean Traditional Superfood

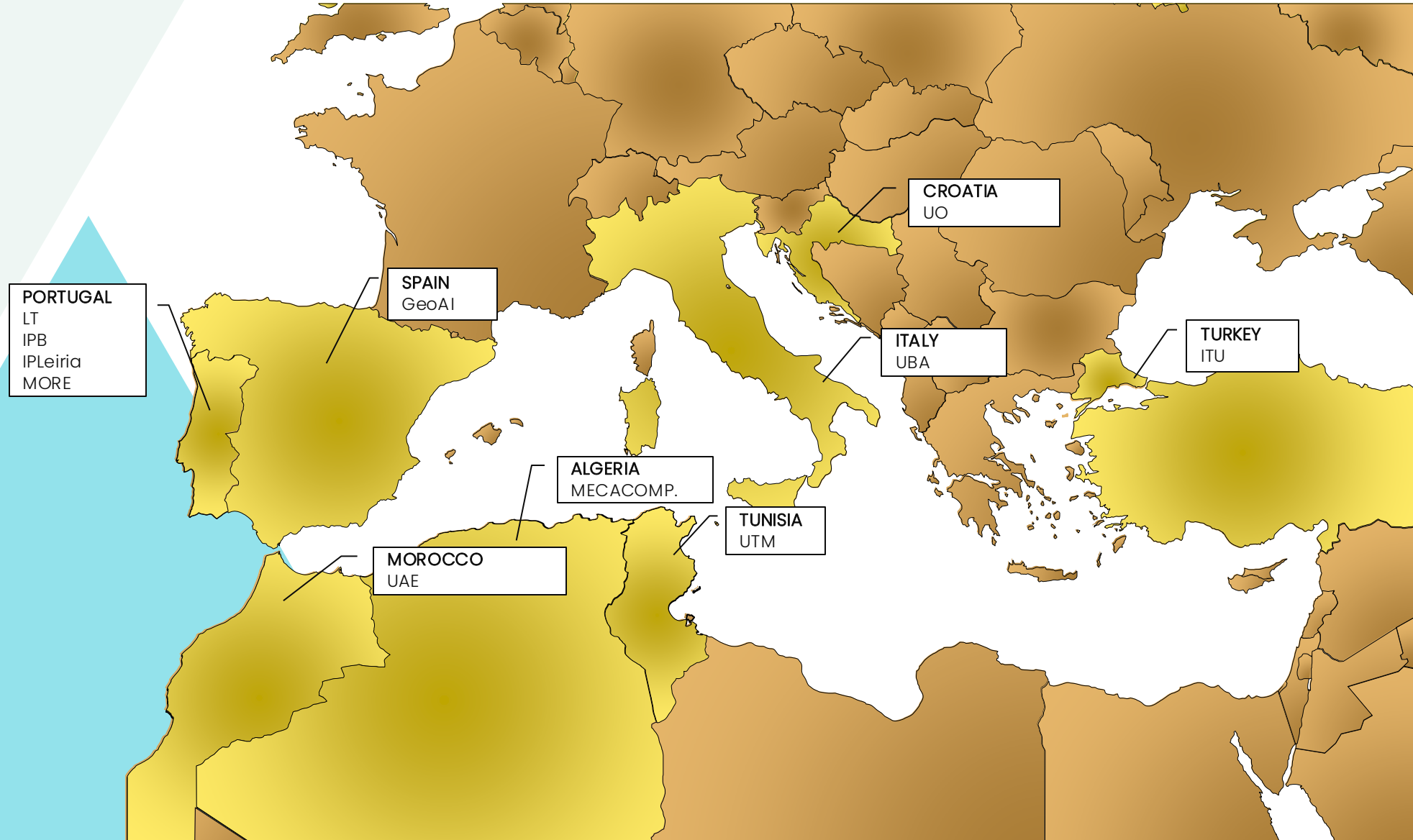
OUR SOLUTION

*The MEDACORNET project aims to **enhance the adherence to the Mediterranean diet**, through the development of **new products based on acorn**, as a Mediterranean historical superfood, while **promoting the actors** involved in its production and transformation.*

WHO ARE WE?

11
Partners

8
Countries



WHAT DO WE AIM FOR?

- **SO1** Assessment of oak forest distribution in the Mediterranean basin, as well as value chain and stakeholder mapping
- **SO2** Rescue of traditional/historical uses of acorns for human consumption
- **SO3** Characterization of the nutritional profile of acorns from the most relevant Mediterranean-native Quercus spp.
- **SO4** Design of a pilot line capable of producing edible flour from acorns of different species

WHAT DO WE AIM FOR?

- **SO5** Development of novel acorn-based gluten-free, healthy food products
- **SO6** Evaluation of health benefits such as prebiotic and antioxidant effects of acorns of low carbon footprint
- **SO7** Exploration of the residues of acorn processing to improve the sustainability of the transformation process
- **SO8** Development of a targeted and efficient communication strategy to raise stakeholders' awareness on acorn potential as superfood

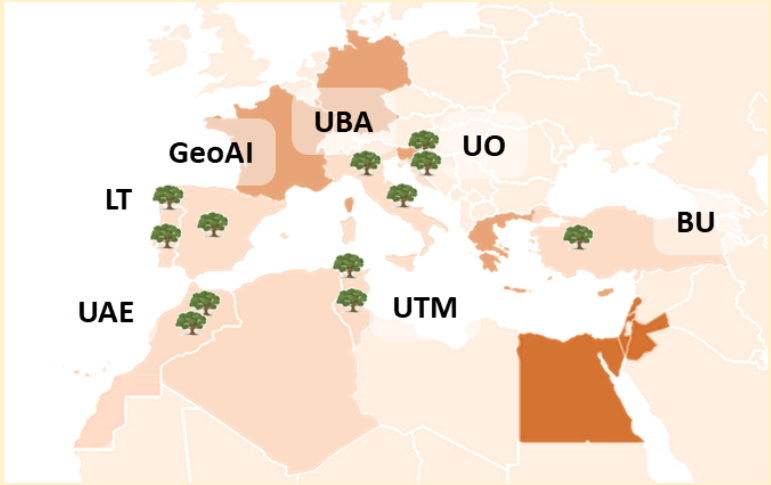
WHAT DO WE AIM FOR?

- SO9 Reduction of acorn value chain fragmentation by creating a digital marketplace
- SO10 Assessment of the socioeconomic and environmental impacts of revamping the Mediterranean acorn value chain
- SO11 Development of dietary guidelines and promotion strategies to foster the adoption of acorns as sustainable and healthy ingredient for the Mediterranean diet

HOW WILL WE ACHIEVE IT?

Stage 1

Survey of acorn production and value chain from the Mediterranean region



Mapped value chain

Acorns

Stage 2

Optimizing the acorn transformation process to produce, pack, store and preserve edible acorn granulate/flour

LT, IPB, UBA, IPLeiria, MECACOMP

High quality raw materials

Acorns

Flour/ granulate

Stage 3

Biochemical, nutritional, morphological and functional characterization of acorn and derived flour/granulate

Acorn	Partner
Nutritional	IPLeiria, IPB, UBA, UO, UTM
Morphological	UO, UTM

Flour/ granulate	Partner
Nutritional	IPLeiria, IPB, UBA, UO, UTM
Morphological	UO
Techno-funciontal	UBA, UO
Safety	LT, IPB, UTM

Flour/ granulate By-products

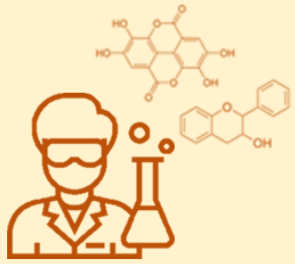
Nutricional/ nutraceutic value

Stage 4

Production of novel acorn-based food products and valorization of processing by-products

Prototypes

IPLeiria, UBA, UO



IPB, UTM

Stage 5

Designing and implementing efficient communication and dissemination strategies to foster the adoption of acorns as a sustainable and healthy Mediterranean food, including an exploitation plan

MORE, GeoAI, BU

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Work Package 1

Survey and Collection of Acorns from the Mediterranean Region (Jun 2023 – May 2025)

WP1 – OBJECTIVES

General Aim

i) Survey the practices associated with the entire acorn cycle, developed in the Mediterranean region;

ii) Map the acorn-production forests distribution in the Mediterranean basin.

Task 1.1 — *Review of practices associated with the acorn cycle for human consumption in Mediterranean basin (M01-M12; Leader: UAE).*

Task 1.2 — *Inventory of acorn-production forests distribution in the Mediterranean basin and value chain mapping in the region (M01-M24; Leader: GeoAI).*

Task 1.3 — *Identification of harvesting points and methodology for acorn sampling (M04-M24; Leader: LT).*

WP1 – REVIEW OF PRACTICES ASSOCIATED WITH THE ACORN CYCLE FOR HUMAN CONSUMPTION IN MEDITERRANEAN BASIN

Online survey - 165 responses have been gathered:

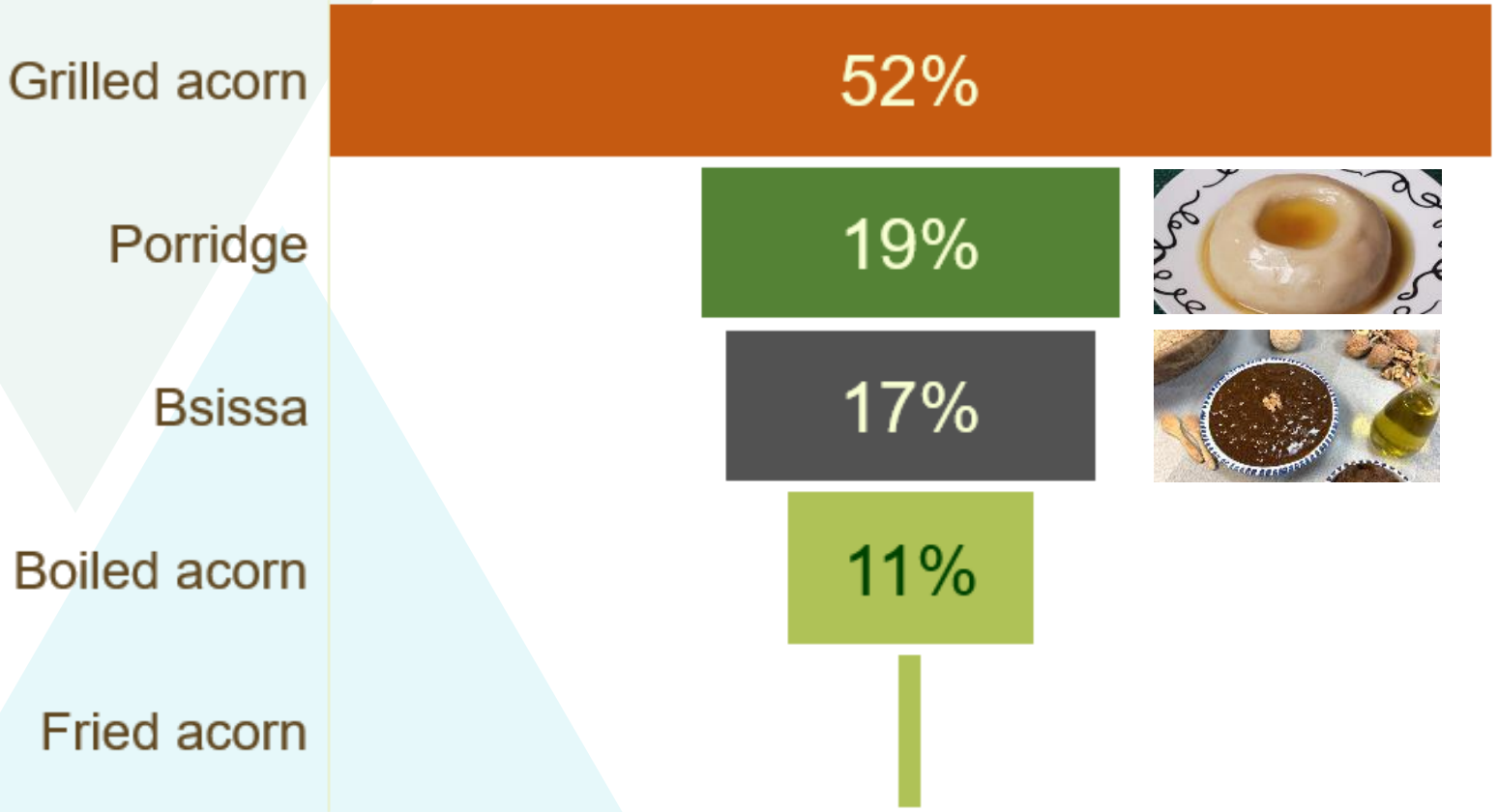
121 (Morocco)
29 (Italy)
9 (Spain)
1 (Portugal)
4 (other)

Face-to-face inquiries.

Photo credits:
Eleonora Matarrese

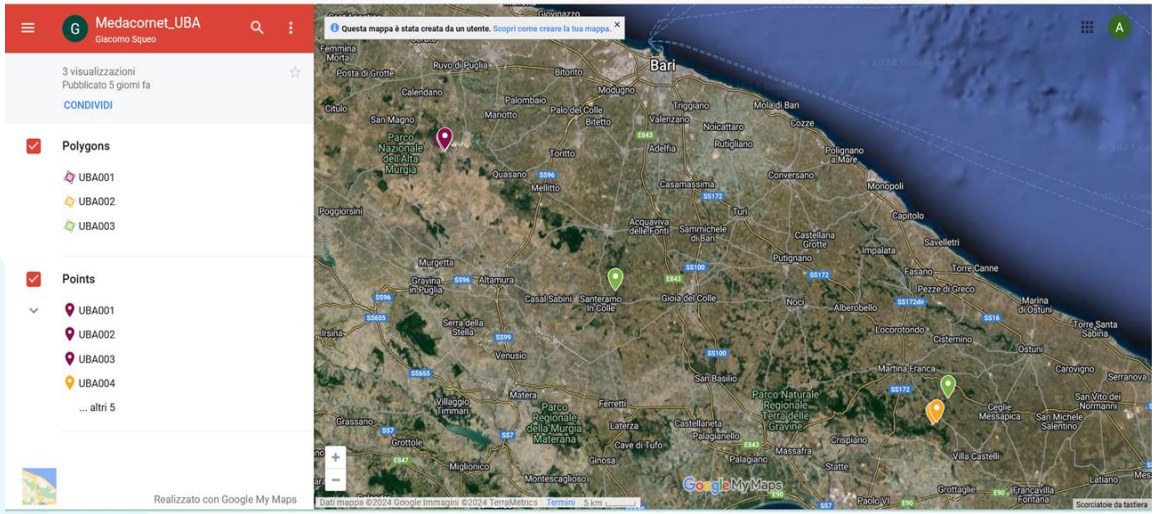
Evidence of use (pre-1990's) as flour, bread and coffee substitute.

WP1 – ACORN-BASED DISHES IN TUNISIA



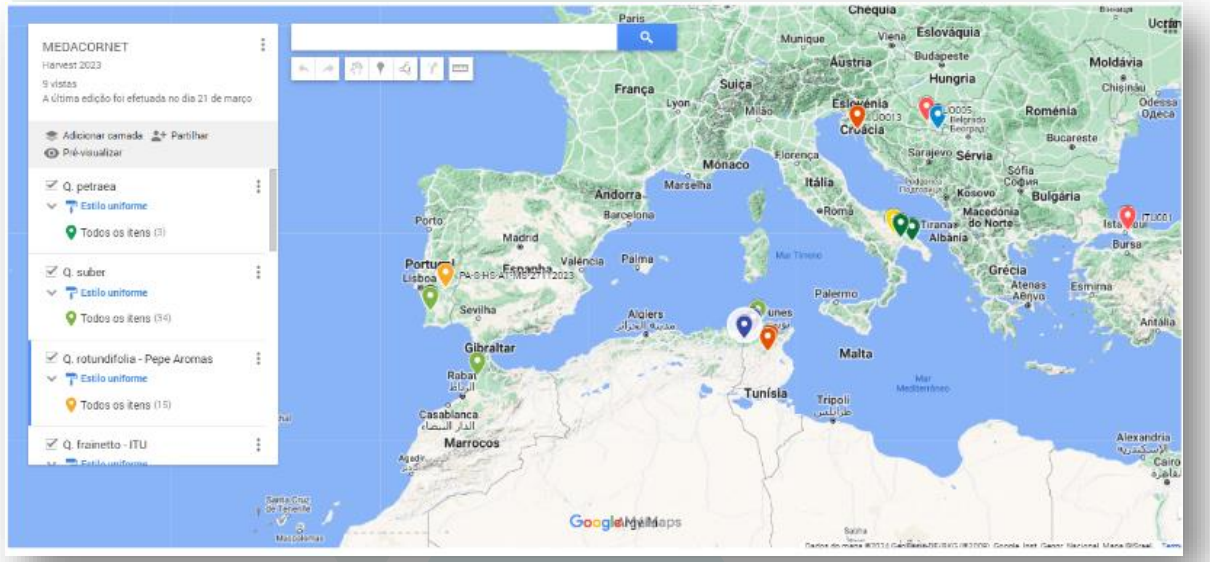
The consumption of these acorns is primarily driven by famine

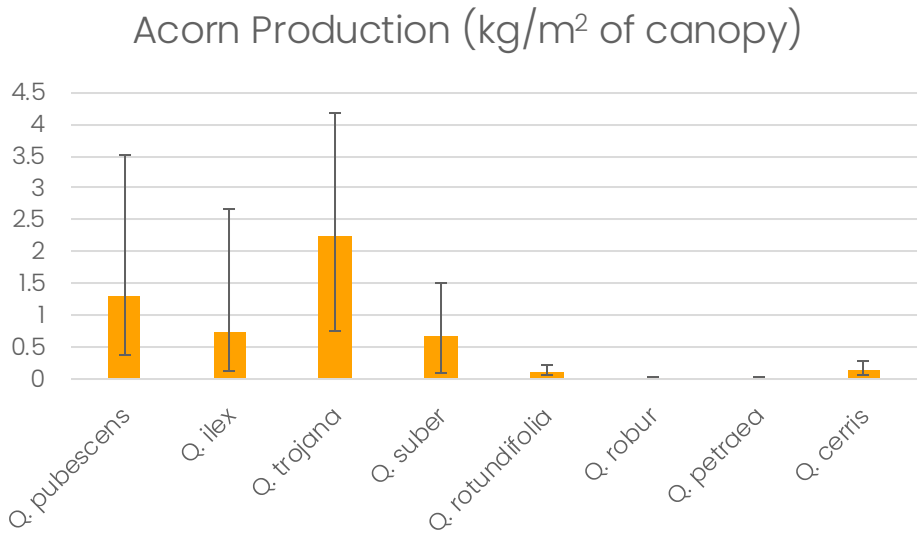
WP1 - INVENTORY OF ACORN-PRODUCTION FORESTS DISTRIBUTION IN THE MEDITERRANEAN BASIN AND VALUE CHAIN MAPPING IN THE REGION



- Metadata distribution of *Quercus sp.*
- Visual data collected by partners.
- Development of AI Algorithms to identify productive forests and predict productivity and maturation.

WP1 - IDENTIFICATION OF HARVESTING POINTS AND METHODOLOGY FOR ACORN SAMPLING





- Georeferentiation of harvesting sites.
- Agronomic data collection (e.g. yield/m2, maturation date).
- Test of traditional and industrialized harvesting methodologies.

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Work Package 2

Design of an Acorn Transformation Line into Edible Gluten-free Granulate (Jun 2023 – Feb 2026)

WP2 - OBJECTIVES

General Aim

i) Optimise an acorn transformation process at laboratory/semi-pilot scale, for the generation of edible gluten-free acorn flour/granulate, with reduced tannin content;

ii) Model and design an industrial acorn transformation line based on the optimised lab-scale process.

Task 2.1 — *Optimization of the acorn processing protocol at laboratory/pilot scale (M01-M24; Leader: LT).*

Task 2.2 — *Improvement of the design of the elements and equipment suited for transforming the acorns (M06-M33; Leader: IPB).*

Task 2.3 — *Design of an industrial acorn processing line (M06-M33; Leader: IPB).*

WP2 - REMOVAL OF TANNINS PRESENT IN ACORNS IN ORDER TO MAKE THE PRODUCT MORE PALATABLE

Acorn Pulp
From *Quercus suber*

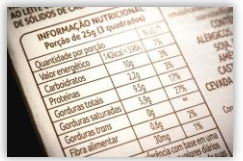
Leaching with water at room temperature 3x

Drying at 40°C & Grinding

Acorn Flour

Analized & Compared

Nutritional Composition



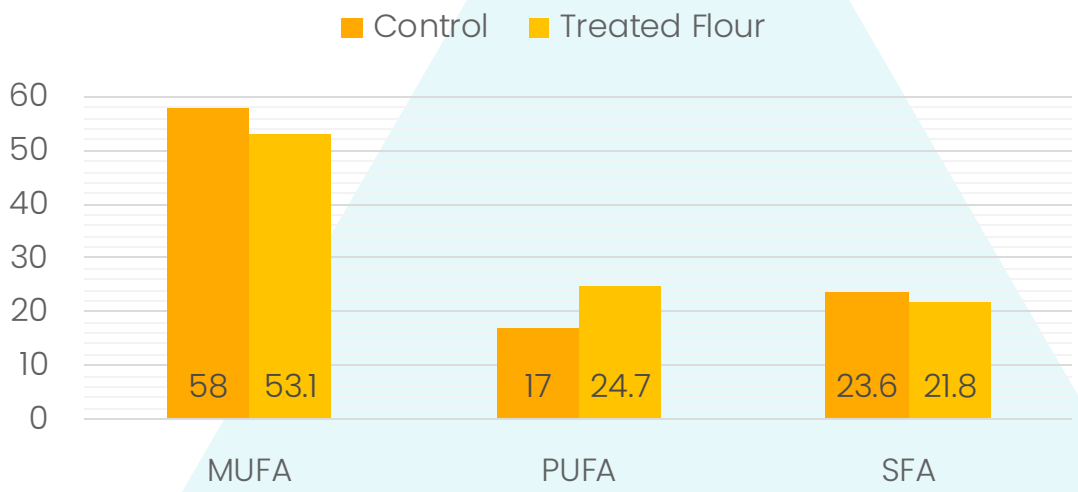
Phenolic Composition

HPLC-DAD-ESI/MS

WP2 – NUTRITIONAL VALUE

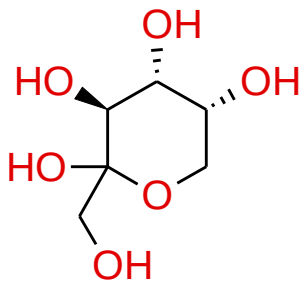
	Moisture (g/100 g)	Crude protein (g/100 g)	Crude fat (g/100 g)	Ash (g/100 g)	Total Carbohydrates (g/100 g)	Fiber (g/100 g)	Starch (g/100g)	Energy (kcal/100g)
Control	9.5 ± 0.5	6.03 ± 0.03	5.1 ± 0.3	2.3 ± 0.2	77.2 ± 0.5	27.3 ± 1.0	20.14 ± 0.09	324 ± 2
Treated Flour	10.2 ± 0.6	5.3 ± 0.1	5.6 ± 0.1	0.90 ± 0.09	78.0 ± 0.7	19.0 ± 0.6	54.2 ± 0.6	345 ± 3

Total Fatty Acid Composition (Relative %)

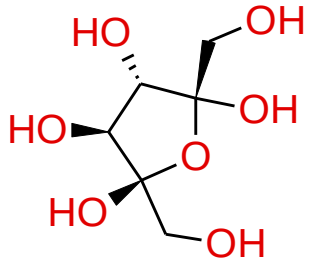


Soluble Sugars

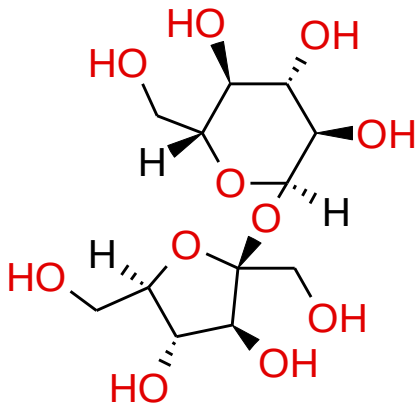
Control → **18.9 ± 0.8 g/100g**



3.9 ± 0.4 g/100g



4.23 ± 0.06 g/100g



10.8 ± 0.4 g/100g

WP2 – PHENOLIC COMPOSITION

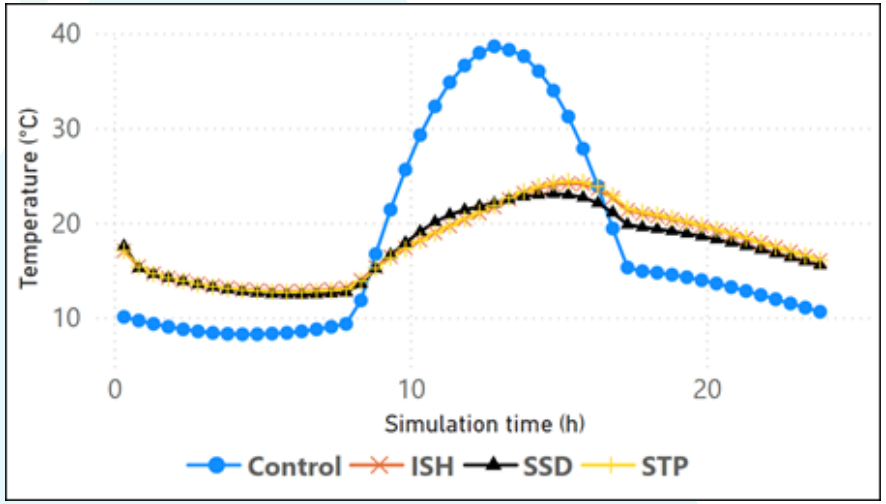
Quantification (mg/g of extract)			
Peak	Tentative Identification	Control	Treated Flour
1	Gallic acid	23 ± 1	5.5 ± 0.2
2	Tergallagic acid-glucoside	3.9 ± 0.1	Traces
3	Pedunculagin (bis-HHDP-glucose)	1.28 ± 0.05	Traces
4	Trigalloyl-HHDP-glucoside	Traces	Traces
5	Ellagic acid hexoside	1.39 ± 0.01	1.267 ± 0.003
6	Tetragalloyl-glucose	0.04 ± 0.01	N.D.
7	Ellagic acid	2.13 ± 0.03	1.41 ± 0.01
8	Trigalloyl-glucose	1.51 ± 0.01	N.D.
9	Ellagic acid pentoside	1.66 ± 0.02	1.26 ± 0.003
10	Methylellagic acid-pentose	1.45 ± 0.01	Traces
	Total phenolic compounds	**37 ± 1**	**9.6 ± 0.2**

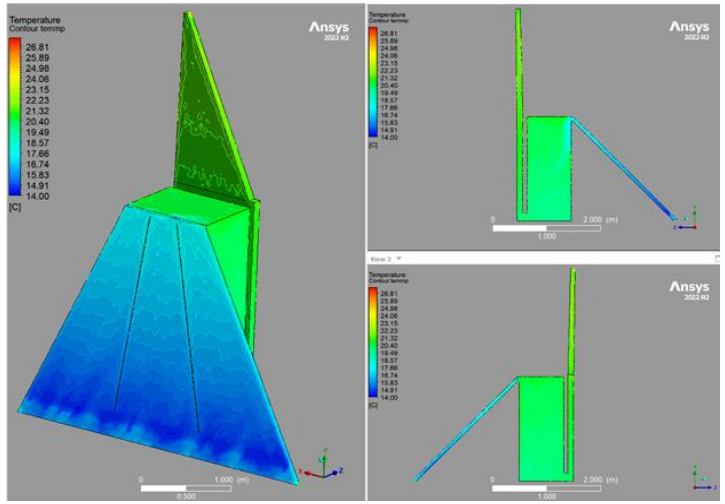
Effective treatment for tannin removal

WP2 – ACORN PROCESSING LINE

Ideation of an autonomous acorn harvester.

Autonomous acorn drier prototype built in the Ecole National Polytechnique Oran by Mecacomp





Passive solar dryer developed by IPB.

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Work Package 3

Biochemical, Nutritional and Functional Characterization of Acorns and Acorn Flour/Granulate from Different Species (Dec 2023 – Feb 2026)

WP3 - OBJECTIVES

General Aim

i) Characterise the biochemical composition, myco-toxicological properties and nutritional profile of acorns and acorn flour/granulate from different species;

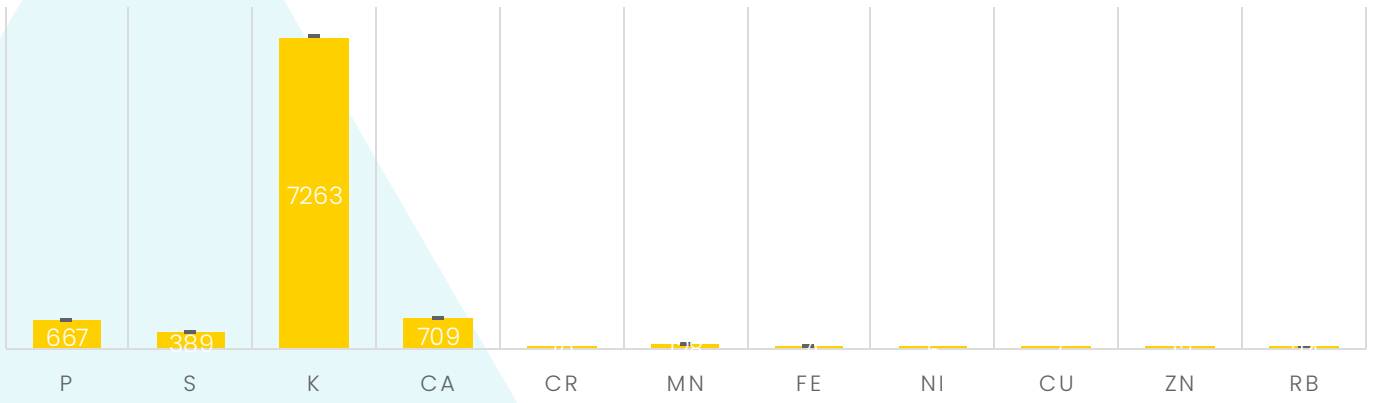
ii) Assess the techno-functional and rheological properties, as well as digestibility, of acorns and/or acorn flour/granulate from different species.

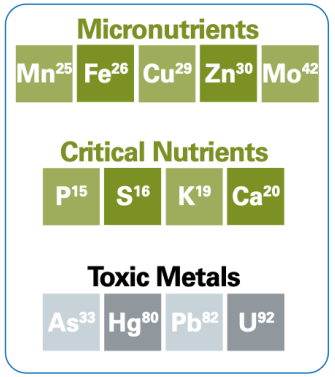
Task 3.1	*Nutritional, biochemical, and morphological characterization of acorn and acorn flour/granulate (M07-M33; Leader: IPLeiria).*
Task 3.2	*Myco-toxicological characterization of acorns (M13-M33; Leader: LT.*
Task 3.3	*Assessment of the techno-functional and rheological properties of the acorn flour/granulate and dough (M07-M33; Leader: UBA).*
Task 3.4	*Evaluation of acorn digestibility (M13-M33; Leader: IPLeiria.*

WP3 – MICRONUTRIENTS

ID /ppmc	P	±2σ	S	±2σ	K	±2σ	Ca	±2σ	Cr	±2σ	Mn	±2σ	Fe	±2σ	Ni	±2σ	Cu	±2σ	Zn	±2σ	Rb	±2σ
FB22.1F1	667	36	389	22	7263	45	709	13	10	3	128	8	71	8	5	2	7	1	12	1	24	3

XRF Spectrometer (From Mg – U) non-destructive method and a green alternative to traditional ICP and AAS atomic spectroscopy methods.

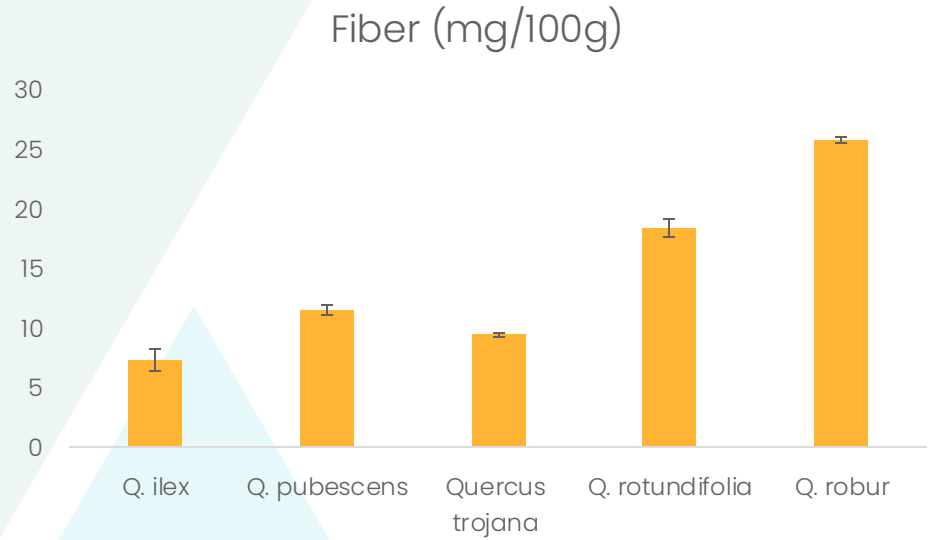


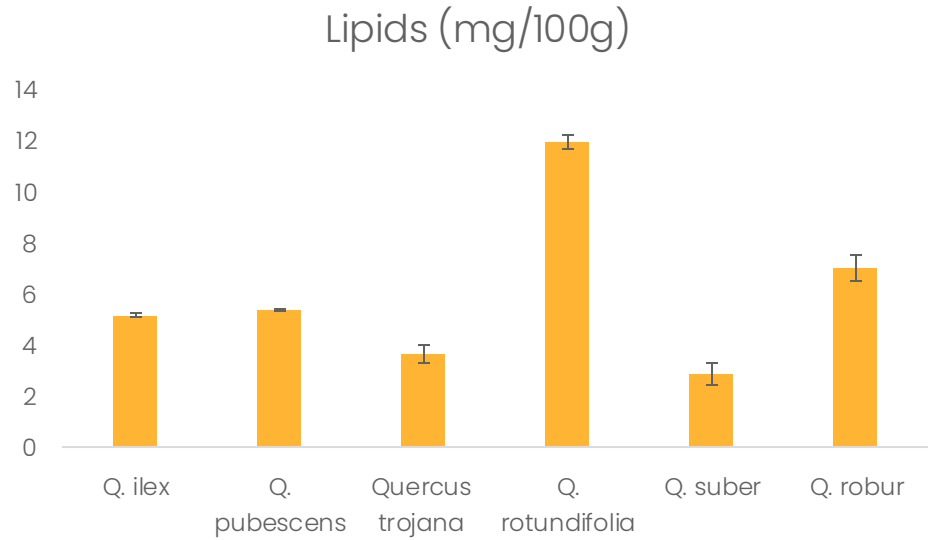


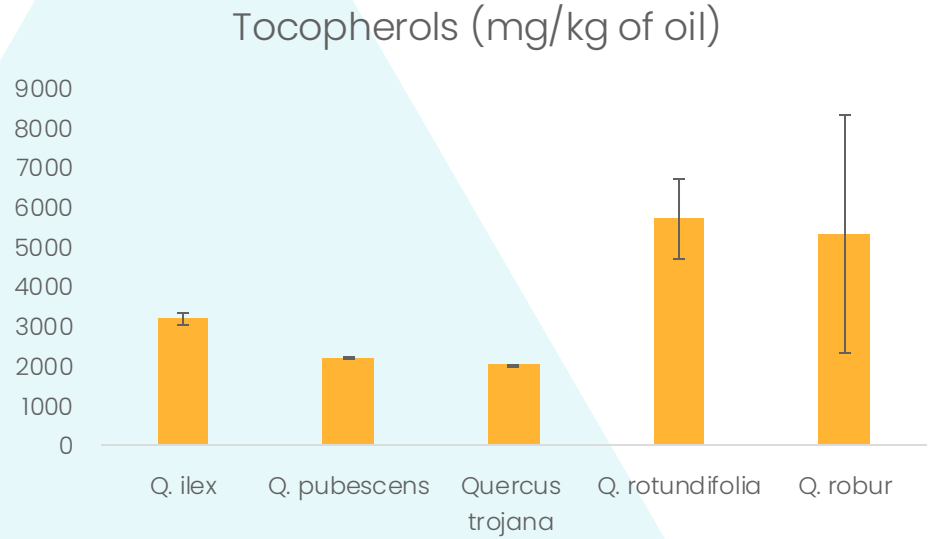
WP3 – NUTRITIONAL COMPOSITION

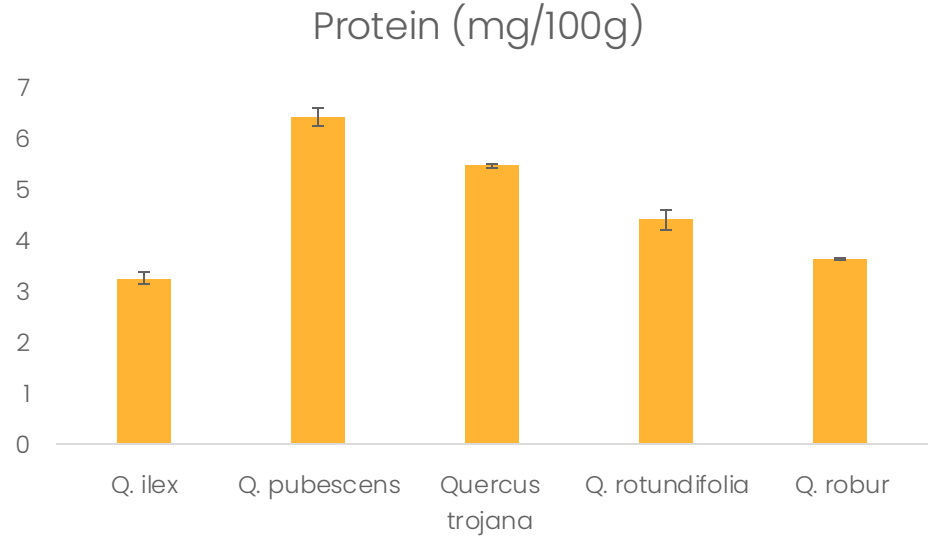
The acorns are rich in fiber and Vitamin E.

Strong inter- and intra-specific variability



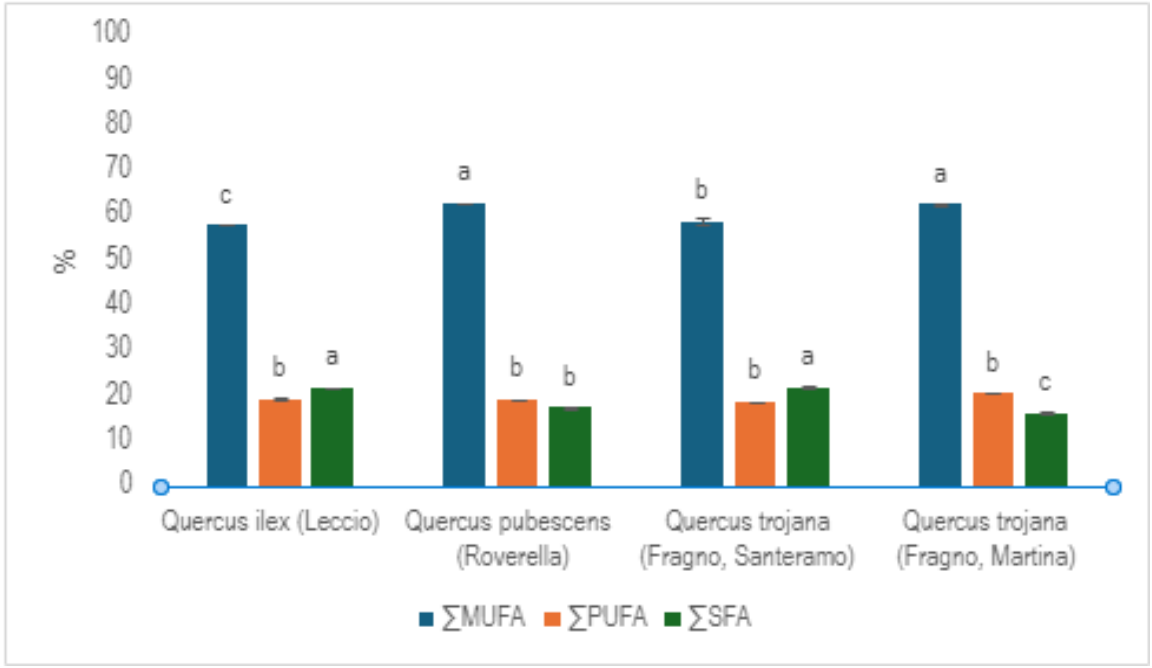






WP3 – BIOACTIVE COMPOUNDS & FATTY ACIDS

The acorns were rich in MUFA, in particular oleic acid.



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Work Package 4

Study of Storage and Conservation Conditions of Acorn Flours and Granulates

(Feb 2024 – May 2026)

WP4 – OBJECTIVES

General Aim

i) Optimise the storage and conservation conditions of acorn flours and granulates produced in WP2;

ii) monitor the potential oxidative degradation of the products during storage;

iii) Assess the secondary shelf-life of the products.

Task 4.1 *Optimization of packaging conditions and preservation of acorn flours and granulates (M09-M36; Leader: UBA).*

Task 4.2 *Evolution of oxidative degradation during storage (M13-M36; Leader: UBA).*

Task 4.3 *Secondary shelf-life assessment (M13-M36; Leader: UBA).*

WP4 – PRELIMINARY RESULTS

Parameter	Sample 1 - flour	Sample 1 - kernel	Sample 2
Lipid (%)	11.39±0.31a	4.26±0.49b	11.56±0.05a
Peroxide value (meq O2 /kg oil)	14.48±0.71a	12.03±1.79b	5.84±0.13c

Volatile Compounds (µg/g)	Sample 1 - flour	Sample 1 - Kernel	Sample 2
Aldehydes			
Hexanal	98.08±0.66a	54.69±1.25b	51.27±0.66c
Nonanal	34.06±0.34a	26.66±0.43b	26.08±0.34b
Nonadienal	4.33±0.07b	1.21±0.06c	5.38±0.07a
Octanal	17.69±0.12a	5.58±0.23c	9.09±0.12b

The **milling** increased the oxidation state, but not too significantly

The **quality** of the **raw material** significantly affected the **oxidative state** of the flour, with differences between the two batches in terms of **peroxides** and **volatile compounds** associated with rancid and fatty odors.

The results showed that the quality of the raw acorn is probably more influent on the quality of the flours than the process applied to obtain the flours.

WP4 – OPTIMIZATION OF PACKAGING CONDITIONS AND PRESERVATION OF ACORN FLOURS AND GRANULATES

Acorn flour and kernel stored in environmental atmosphere conditions, under vacuum and in a modified atmosphere (MAP) 50:50 N_2:CO_2 and 80:20 N_2:CO_2 at room temperature (25ºC).

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Work Package 5

Development of Innovative Methods to Produce Novel Acorn-Based Food (Feb 2024 – May 2026)

WP5 - OBJECTIVES

General Aim

i) Create five innovative acorn-based food products by rescuing or reinventing traditional recipes;

ii) Evaluate the quality of the acorn-food products through acceptance and sensory tests;

iii) Compile historical, market and technical data on acorn human consumption.

Task 5.1 *Rescue or reinvent traditional recipes produced with acorn (M09-M36; Leader: UAE).*

Task 5.2 *Testing acorn flour/granulate to produce food prototypes (M10-M36; Leader: UBA).*

Task 5.3 *Evaluation of the quality of prototypes developed through acceptance and sensory tests (M15-M36; Leader: UO).*

WP5 – RESCUING TRADITIONS

Acorn-based coffee-substitutes "*Caffeol*" (Pontedera, Pisa, Italy)

Moroccan couscous based on different seeds including acorn (Mokrissat, Morocco)

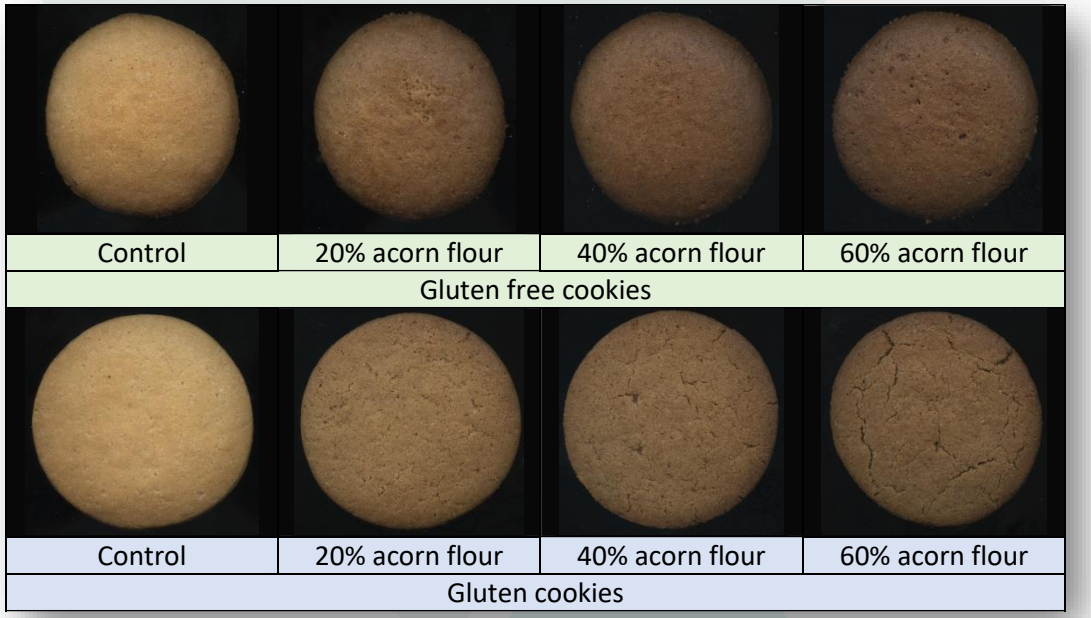
Traditional Portuguese "*broa*" made with acorn (Famalicão, Portugal)

WP5 – PRELIMINARY RESULTS

- **Innovative Products:** Ongoing research on the development of the following acorn-based products:
  - crackers (gluten-free and with gluten)
  - cookies (gluten-free and with gluten)
  - bread (gluten-free and with gluten)

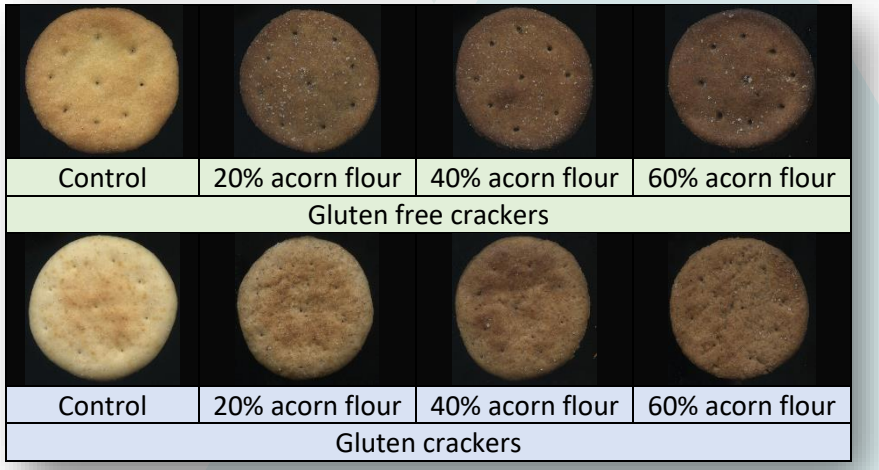
- **Academic Contributions:** Four master's theses have been successfully defended on the topic of acorn flour product development.

WP5 – INNOVATIVE PRODUCTS



Control	20% acorn flour	40% acorn flour	60% acorn flour
Gluten free cookies			
Control	20% acorn flour	40% acorn flour	60% acorn flour
Gluten cookies			

Control	50% acorn flour	100% acorn flour
Gluten free bread		



Control	20% acorn flour	40% acorn flour	60% acorn flour
Gluten free crackers			
Control	20% acorn flour	40% acorn flour	60% acorn flour
Gluten crackers			

Control	20% acorn flour	40% acorn flour	60% acorn flour
Gluten bread			

WP5 – INNOVATIVE PRODUCTS

UBA is developing food prototypes using acorn flour. In particular the design of experiment (DoE) approach is used to optimize the formulation of acorn gluten-free pasta. The formulation and process to obtain fresh pasta were performed as described in Costantini et al. (2021), with minimal modifications.

IPLeiria created a Q. rotundifolia vegetable base, that will be used for the development of both the plant-based milk and the acorn pudding.

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Work Package 6

Preliminary Assessment of the Acorn Processing By-products for Broader Industrial Applications (Jun 2024 – Feb 2026)

WP6 – OBJECTIVES

General Aim

i) Characterise acorn extracts originated in WP2, particularly polyphenols/tannins and oils, in terms of biochemical composition, particularly phytochemicals;

ii) Assess the potential bioactivity, in vitro toxicity and antioxidant and anti-microbial capacities of the extracts.

Task 6.1 *Biochemical characterization of compounds extracted from acorn during processing (by-products) (M13-M33; Leader: UTM).*

Task 6.2 *Evaluation of biomedical application of isolated polyphenols (M19-M33; Leader: IPB).*

Task 6.3 *Evaluation of anti-microbial properties of acorn-leached extracts (M19-M33; Leader: UTM).*

WP7 – BIOCHEMICAL CHARACTERIZATION OF COMPOUNDS

Ellagic acid and gallic acid, along with their derivatives, were the primary phenolic compounds found.
Gallotannin digalloyl hexoside was the most abundant compound across all samples.

Sample	Drying Temp. (°C)	Species	Harvest origin	Elevation (m)	Geo. coordinates
Q. rot-1	50	Q. rotundifolia	Bragança	660	41°20'08"N 6°46'37"W
Q. rot-2	50	Q. rotundifolia	Portalegre	159	39°04'35"N 7°55'03"W
Q. sub-1	50	Q. suber	Braga	331	41°31'43"N 8°18'56"W
Q. sub-2	25	Q. suber	Leiria	350	39°37'58"N 8°40'22"W
Q. rob-1	75	Q. robur	Braga	78	41°32'23"N 8°40'35"W

Harvest and processing information of the studied acorn shell samples.

Peak	Tentative Identification	Q. rot-1	Q. rot-2	Q. sub-1	Q. sub-2	Q. rob-1
1	Digalloyl hexoside	3.9 ± 0.1	8.3 ± 0.1	3.38 ± 0.04	2.93 ± 0.03	3.16 ± 0.04
2	Gallic acid	0.90 ± 0.03	0.493 ± 0.004	0.81 ± 0.04	0.60 ± 0.03	1.34 ± 0.01
3	Galloyl-HHDP-glucose	tr.	0.42 ± 0.01	tr.	tr.	tr.
4	Punicalin	tr.	Nd.	Nd.	tr.	tr.
5	Digalloyl-HHDP-hexose	tr.	Nd.	tr.	Nd.	Nd.
6	Ellagic acid hexoside	1.1927 ± 0.0003	Nd.	1.202 ± 0.001	1.195 ± 0.001	1.191 ± 0.001
7	Ellagic acid pentoside	Nd.	Nd.	Nd.	Nd.	1.193 ± 0.001
8	Ellagic acid	1.259 ± 0.001	1.210 ± 0.002	1.399 ± 0.002	1.425 ± 0.004	1.270 ± 0.003
9	Methyl ellagic acid pentoside	1.2013 ± 0.0004	1.212 ± 0.001	1.217 ± 0.001	Nd.	1.197 ± 0.001
Total Phenolic Compounds		8.5 ± 0.1	11.6 ± 0.1	8.0 ± 0.1	6.15 ± 0.08	9.3 ± 0.1

Tentative identified phenolic compounds and their quantification (mg/g) in acorn shell extract samples.

WP7 – ANTIOXIDANT ACTIVITY OF ACORN

In the TBARS assay, Q. suber samples (Q. sub-1 and Q. sub-2) showed the lowest EC50 values, indicating **strong antioxidant activity**.

In the CAA assay, **all samples neutralized reactive oxygen species** - Q. rot-1 showing the highest inhibition.

Inhibition of all tumor cell lines except for Q. sub-2, which had no effect on AGS cells (GI50 >400 µg/mL). Q. rot-2 demonstrated the highest GI50 values against the non-tumor PLP2 cell line, indicating better cytocompatibility.

	Q. rot-1	Q. rot-2	Q. sub-1	Q. sub-2	Q. rob-1	Positive Control
Antioxidant Activity						
TBARS (EC_{50}, µg/mL)	18.4 ± 0.1	14.0 ± 0.1	6.02 ± 0.04	4.0 ± 0.2	13.4 ± 0.1	5.39 ± 0.28
CAA (% inhibition at 2 mg/mL)	64 ± 8	49 ± 9	44 ± 9	56 ± 10	57 ± 7	95 ± 5
Antiproliferative activity (GI_{50}, µg/mL)						
AGS	195 ± 16	162 ± 12	138 ± 13	>400	167 ± 15	1.23 ± 0.03
Caco-2	213 ± 18	183.34 ± 19	162.05 ± 7,42	164 ± 15	206 ± 4	1.21 ± 0.02
MCF-7	286 ± 51	223 ± 13	210 ± 6	181 ± 32	271 ± 55	1.02 ± 0.02
NCI-H460	278 ± 23	201 ± 19	207 ± 18	153 ± 12	251 ± 22	1.01 ± 0.01
PLP2	252 ± 22	265 ± 27	191 ± 18	134 ± 36	248 ± 28	1.4 ± 0.1
NO-production inhibition (IC_{50}, µg/mL)						
RAW 264.7	>400	>400	>400	>400	>400	6.3 ± 0.4

Results of the studied acorn shell extracts' antioxidant (TBARS and CAA assays), antiproliferative, and NO-production inhibition assays.

WP7 – ANTI-MICROBIAL PROPERTIES

Most of the tested extracts inhibited bacterial growth, but none showed antifungal activity.

		Acorn Shell Samples					Positive Controls		
		Q. rot-1	Q. rot-2	Q. sub-1	Q. sub-2	Q. rob-1	Ampicillin	Imipenem	Vancomycin
Antibacterial Activity - Clinical bacteria (MIC/MBC, mg/mL)									
Gram-negative	**E. coli**	10/10	>10/>10	2.5/10	>10/>10	>10/>10	<0.15/<0.15	<0.0078/<0.0078	n.t/n.t
	K. pneumoniae	10/>10	>10/>10	5/>10	>10/>10	>10/>10	10/>10	<0.0078/<0.0078	n.t/n.t
	M. morganii	2.5/2.5	>10/>10	0.3/1.25	>10/>10	>10/>10	>10/>10	<0.0078/<0.0078	n.t/n.t
	P. mirabilis	2.5/10	>10/>10	2.5/10	>10/>10	>10/>10	<0.15/<0.15	<0.0078/<0.0078	n.t/n.t
	P. aeruginosa	10/>10	>10/>10	1.25/>10	>10/>10	>10/>10	>10/>10	0.5/1	n.t/n.t
Gram-positive	**E. faecalis**	10/10	>10/>10	10/>10	>10/>10	>10/>10	<0.15/<0.15	n.t/n.t	<0.0078/<0.0078
	L. monocytogenes	10/>10	>10/>10	2.5/10	>10/>10	>10/>10	<0.15/<0.15	<0.0078/<0.0078	n.t/n.t
	MRSA*	1.25/10	>10/>10	0.6/10	>10/>10	>10/>10	<0.15/<0.15	n.t/n.t	0.25/0.5
	P. acnes	2.5/10	>10/>10	2.5/>10	>10/>10	>10/>10	0.07/0.07	n.t/n.t	n.t/n.t

Note: Nt. – Not tested; * Methicillin-resistant Staphylococcus aureus. MIC – minimal inhibitory concentration; MBC – minimal bactericidal concentration; MFC – minimal fungicidal concentration. Positive controls: Ampicillin, Imipenem, Vancomycin, Streptomycin, Methicillin, and Ketoconazole.

WP7 – ANTI-MICROBIAL PROPERTIES

		Acorn Shell Samples					Positive Controls		
		Q. rot-1	Q. rot-2	Q. sub-1	Q. sub-2	Q. rob-1	Ampicillin	Imipenem	Vancomycin
	Antibacterial Activity - Food bacteria (MIC/MBC, mg/mL)								
Gram-negative	**E. Cloacae**	5/>10	>10/>10	2.5/2.5	>10/>10	>10/>10	0.15/0.15	0.007/0.007	n.t/n.t
Gram-negative	**E. Coli**	10/10	>10/>10	5/10	>10/>10	>10/>10	0.15/0.15	0.01/0.01	n.t/n.t
Gram-negative	**P. Aeruginosa**	10/>10	>10/>10	10/>10	>10/>10	>10/>10	0.63/0.63	0.06/0.06	n.t/n.t
Gram-negative	**S. Enterica**	5/10	>10/>10	2.5/5	>10/>10	>10/>10	0.15/0.15	0.007/0.007	n.t/n.t
Gram-negative	**Y. enterocolitica**	10/10	>10/>10	5/5	>10/>10	>10/>10	0.15/0.15	0.007/0.007	n.t/n.t
Gram-positive	**B. Cereus**	>10/>10	>10/>10	10/10	>10/>10	>10/>10	n.t/n.t	0.007/0.007	n.t/n.t
Gram-positive	**L. Monocytogenes**	10/>10	>10/>10	2.5/5	>10/>10	>10/>10	0.15/0.15	0.007/0.007	n.t/n.t
Gram-positive	**S. aureus**	2.5/>10	1.25/>10	0.3/5	1.25/>10	>10/>10	0.15/0.15	0.007/0.007	0.007/0.007
	Antifungal Activity (MIC/MFC, mg/mL)						Ketoconazole		
	A. brasiliensis	>10/>10	>10/>10	>10/>10	>10/>10	>10/>10	0.06/0.125		
	A. fumigatus	>10/>10	>10/>10	>10/>10	>10/>10	>10/>10	0.5/1		

Note: Nt. – Not tested; * Methicillin-resistant Staphylococcus aureus. MIC – minimal inhibitory concentration; MBC – minimal bactericidal concentration; MFC – minimal fungicidal concentration. Positive controls: Ampicillin, Imipenem, Vancomycin, Streptomycin, Methicillin, and Ketoconazole.

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Work Package 7

Communication, Dissemination, Impact Assessment and Exploitation (Jun 2023 – May 2026)

WP7 - OBJECTIVES

General Aim

i) coordinate and manage the project and the efficient, smooth and timely execution of all planned activities;
ii) ensure an accurate and on-time communication flow among the project partners and with the funding authority, in order to track the project progress and meet its objectives;
iii) To complete the project within the agreed time schedule and budget.

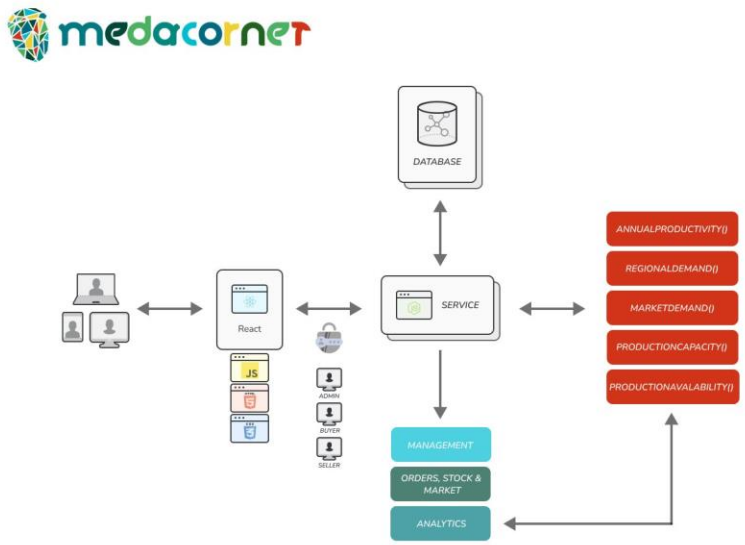
Task 7.1	*Development and implementation of a dissemination and communication strategy (M01-M36; Leader: MORE).*
Task 7.2	*Mapping of acorn food value chain (M01-M12; Leader: LT).*
Task 7.3	*Development of exchange market digital platform for acorns trade (M01-M18; Leader: MORE).*
Task 7.4	*Assessment of socioeconomic and environmental impact of acorn value chain (M13-M36; Leader: ITU).*
Task 7.5	*Exploitation planning (M01-M36; Leader: LT).*
Task 7.6	*Dietary guidelines and promotion strategies for the adoption of acorn as ingredient for Mediterranean healthy and sustainable diets (M25-M36; Leader: LT).*

WP7 – MARKETPLACE FOR ACORN TRADE

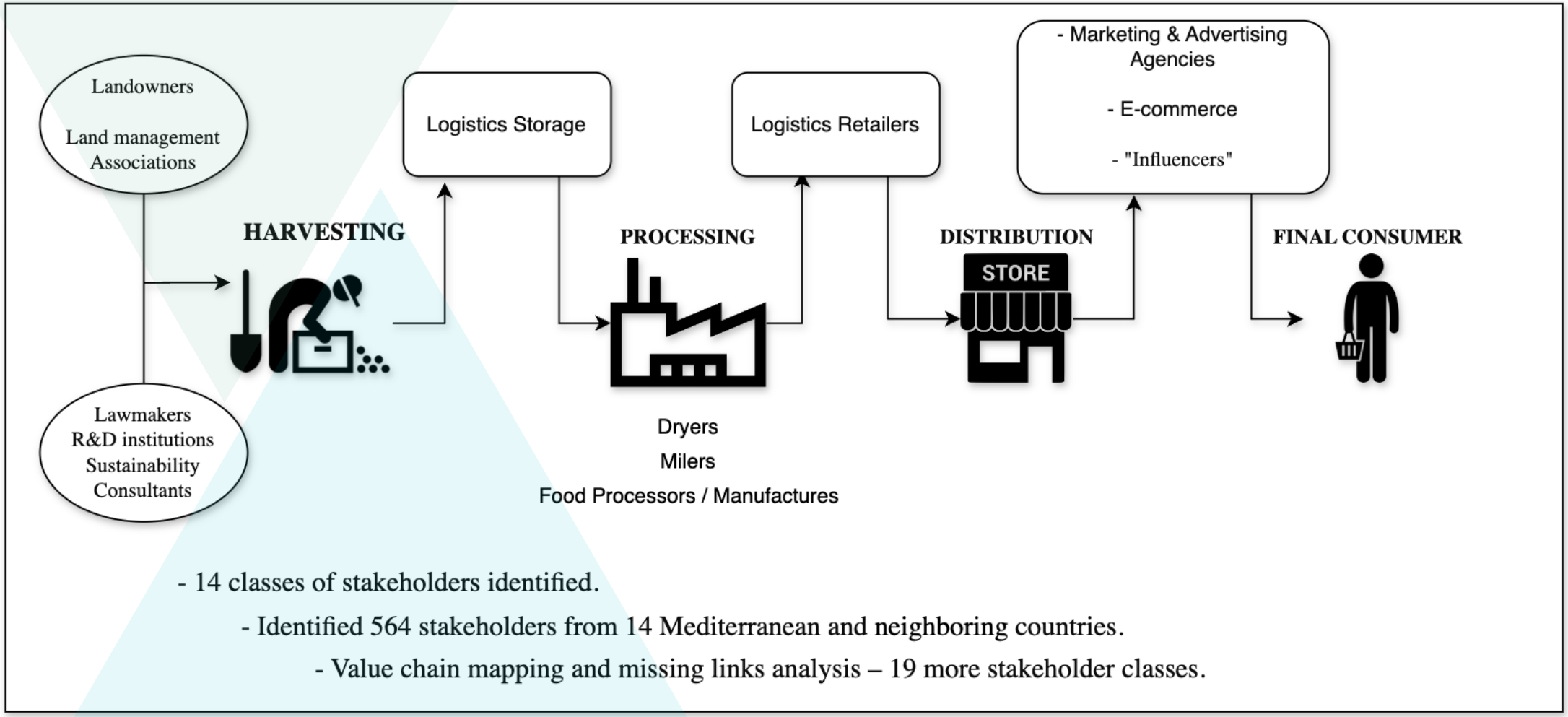
Main Functionalities

- Buy and sell acorn-derived products
- Check location of stores in the map
- Manage orders and inventory
- Check analytics like productivity, demand or availability.

Arquitecture



WP7 – MAPPING OF ACORN FOOD VALUE CHAIN



- 14 classes of stakeholders identified.
- Identified 564 stakeholders from 14 Mediterranean and neighboring countries.
- Value chain mapping and missing links analysis – 19 more stakeholder classes.

WP7 – CONSORTIUM MEETINGS

Kick-off Meeting
Guimarães, Portugal (July 2023)

1st Year Meeting/ 1st awareness action
Tunis, Tunisia (June 2024)

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