

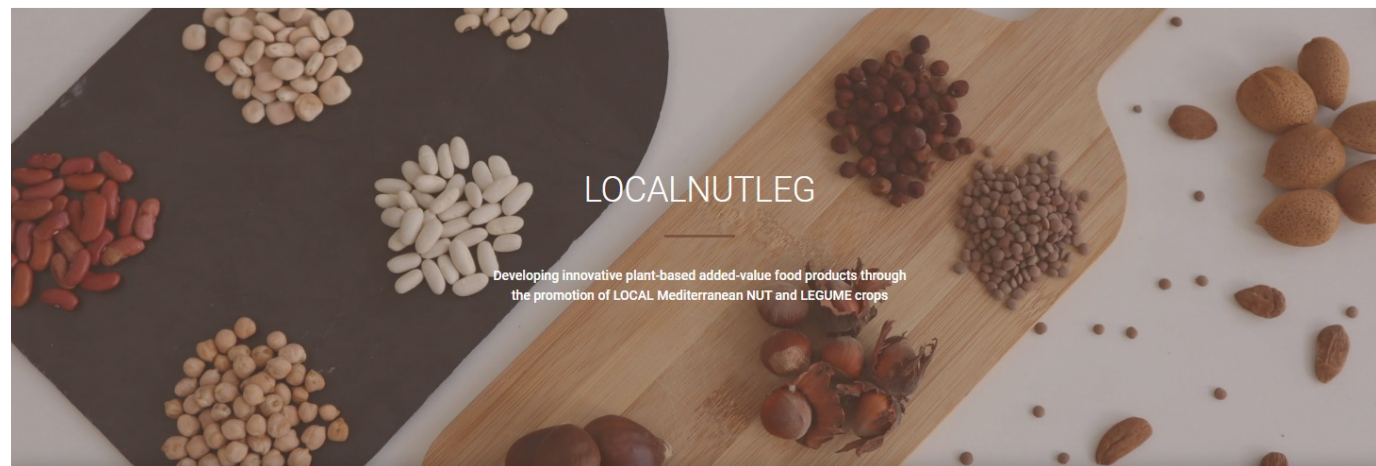
Session 2: Prima initiatives- Sustainable Innovation in the Mediterranean



LocalNutLeg - Developing innovative plant-based added-value food products through the promotion of LOCAL Mediterranean NUT and LEGUME crops

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IRTA^R



The PRIMA programme is supported and funded under Horizon 2020, the Framework European Union's Programme for Research and Innovation

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Sponsors:





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Developing innovative plant-based added-value food products through the promotion of LOCAL Mediterranean NUT and LEGUME crops (LOCALNUTLEG)

42 Months (May 2021- October 2024)

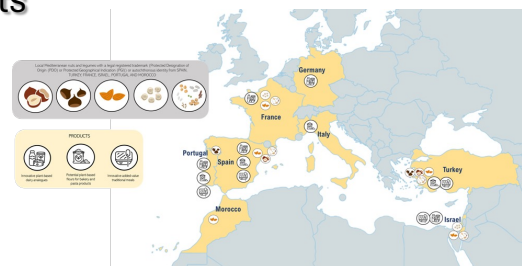
20 Partners (11 RTDs and 9 SMEs)

8 Countries (Spain, Portugal, Germany, Italy, France, Israel, Turkey, and Morocco)

2.246.651,04 € (2 M€ EC contribution)

Innovation Action

Section 1. Call Agro Food Value Chain 2020. 1.3.1.- Valorising the health benefits of the Traditional Mediterranean food products.



PARTNERS



Partner	Organization	Country
1 (coordinator)	Institut de Recerca i Tecnologia Agroalimentaries (IRTA)	Spain
2	Universitat Politècnica de Catalunya (UPC)	Spain
3	Instituto Politécnico de Bragança (IPB)	Portugal
4	Collaborative Laboratory Mountains of Research, Association (MORE)	Portugal
5	University of Milan (UMIL)	Italy
6	Institut National de Recherche pour l'Agriculture, l'Alimentation et l'Environnement (INRAE)	France
7	FRAUNHOFER GESELLSCHAFT ZUR FORDERUNG DER ANGEWANDTEN FORSCHUNG EV (FRAUNHOFER)	Germany
8	Izmir Institute of Technology (IZTECH)	Turkey
9	Bursa Uludag University (BUU)	Turkey
10	Agricultural Research Organization Volcani Center (ARO)	Israel
11	Tel-Hai Academic College (THC)	Israel
12	UNIO NUTS, SCCL (UNIO)	Spain
13	SORTEGEL-Produtos Congelados S.A (SORTEGEL)	Portugal
14	ZINI PRODOTTI ALIMENTARI (ZINI)	Italy
15	UN PA Textile Construction Food Livestock and Electronic Ind.Trade.Co.Ltd. (UN PA Patisserie)	Turkey
16	UrlaWomen Entrepreneurship Production and Management Cooperative (UKKOOP)	Turkey
17	Chickp-Protein (CHICKP)	Israel
18	CONSERVES FERRER, S.A. (FERRER)	Spain
19	Moroccan Almonds International SARL (MAI)	Morocco
20	La Mandorle (LM)	France





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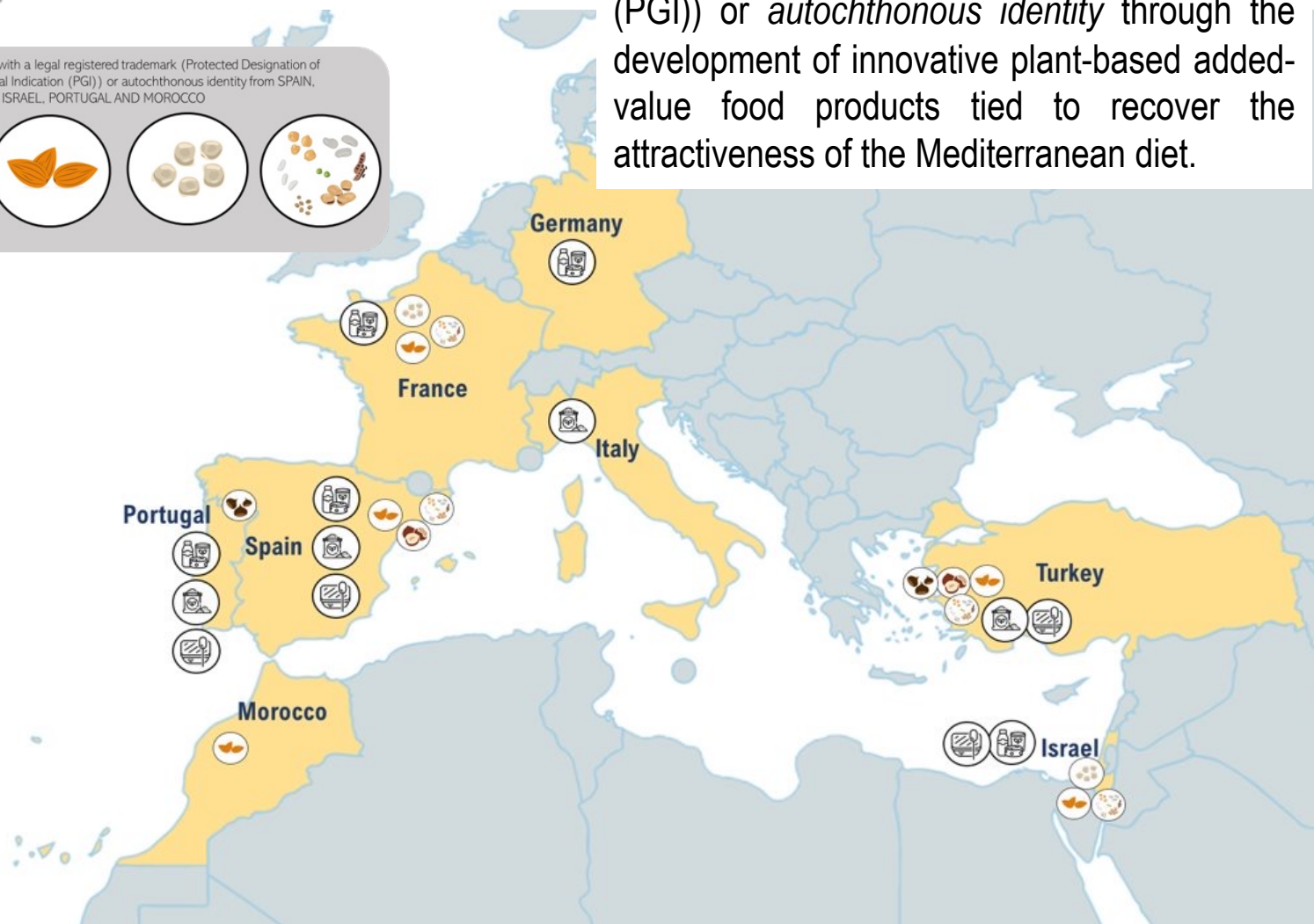
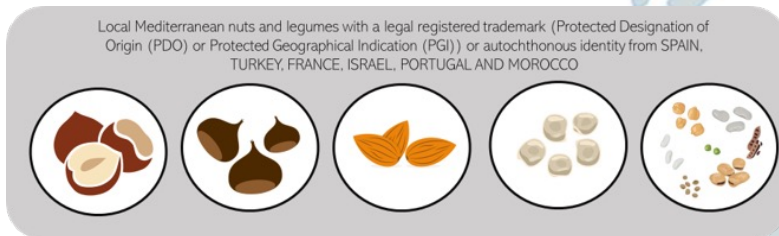
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Motivation to empower local Mediterranean nuts and legumes with a *legal registered trademark* (Protected Designation of Origin (PDO), Protected Geographical Indication (PGI)) or *autochthonous identity* through the development of innovative plant-based added-value food products tied to recover the attractiveness of the Mediterranean diet.



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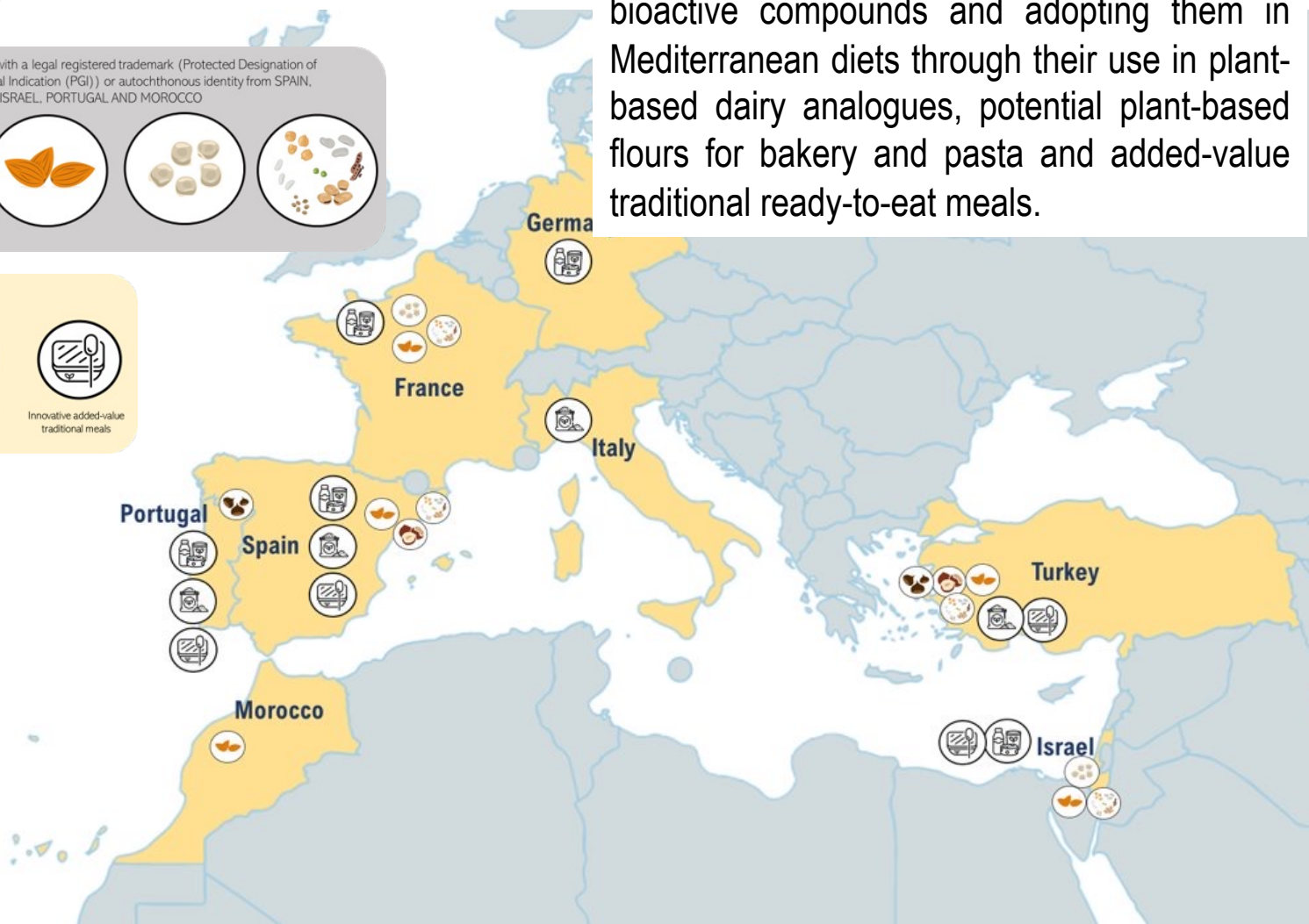
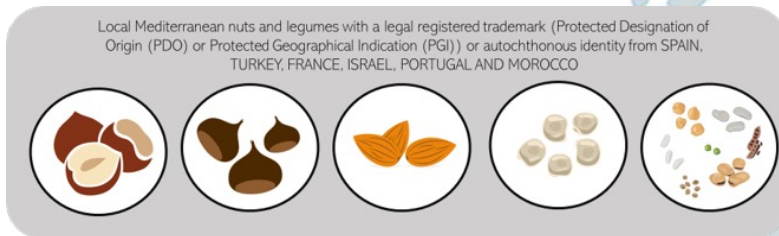
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The project aims to identify local nut and legumes varieties linked to Mediterranean gastronomic cultures, providing alternative-protein and maximum amount of nutrients and bioactive compounds and adopting them in Mediterranean diets through their use in plant-based dairy analogues, potential plant-based flours for bakery and pasta and added-value traditional ready-to-eat meals.



LOCALNUTLEG-Objectives

SO1. To provide a complete nutritional and biochemical portfolio of around 50 identified local nut and legume crops with PDO/PGI/autochthonous identity from the participating Mediterranean countries (Spain, Israel, Portugal, Turkey, France, Morocco) to be valorized as raw food ingredient for the further development of innovative plant-based products. RTDs, SMEs and cooperatives will be involved in the raw materials inventory.

SO2. To produce innovative and healthy plant-based food products using Mediterranean nuts and legumes with PDO/PGI trademark or autochthonous identity. Nutritional and biochemical characteristics of the collected local nuts and legumes will allow to properly process the raw materials into promising plant-food products

SO3. To increase the range of local nut and legume-based products at Mediterranean level. Interactions among local nut and legume producers and food manufacturers will be implemented to ensure collaboration and communication among several actors in order to increase the availability of the new-added value products to the consumers.

SO4. To develop a commercialization and exploitation strategy for all the new developed products to support market of the plant-based developed products, market analyses, business model and exploitation plan.

SO5. To promote the health benefits of the studied local nut and legume varieties in terms of alternative plant-source to animal-based or grain-based flours products as well as to reintroduce them in traditional Mediterranean recipes for the niche consumer



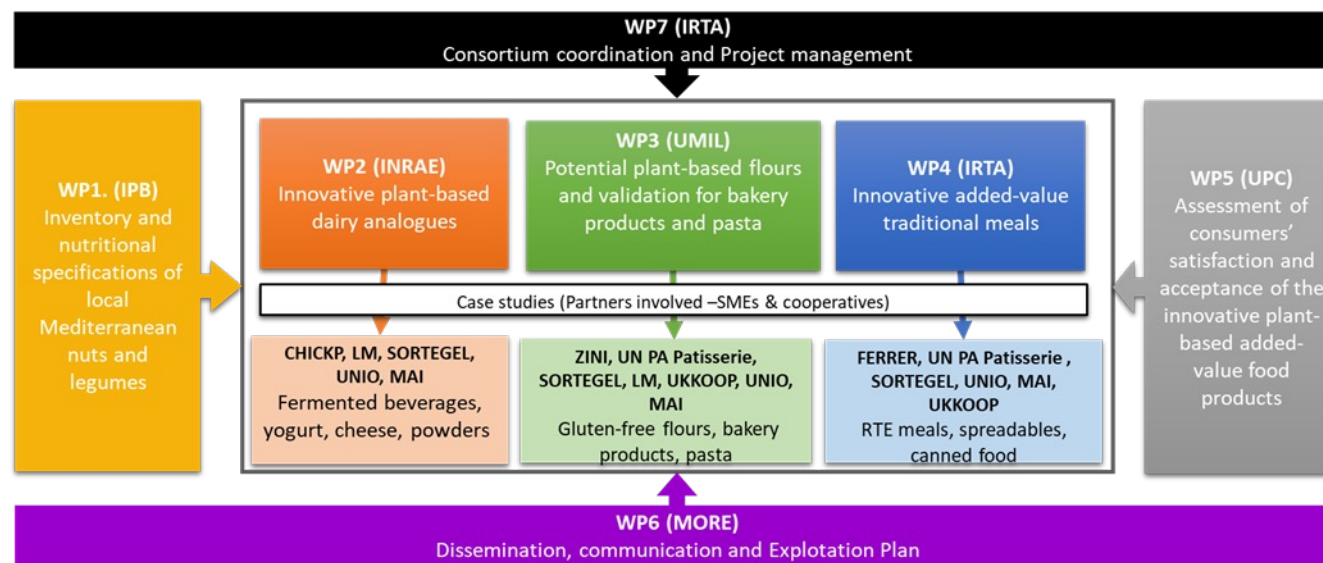
LOCAL



Developing innovative plant-based added-value food products through the promotion of LOCAL Mediterranean NUT and LEGUME crops



LOCALNUTLEG will work under the concept of a multiactor approach consortium formed by researchers, food processing SMEs and cooperatives.

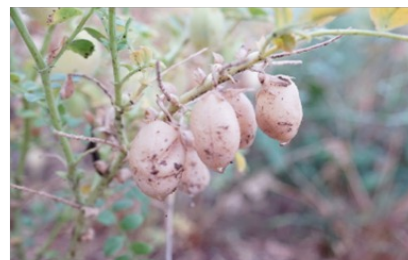


LOCALNUTLEG will answer to the current consumers' demands in terms of healthiness, convenience, ease of preparation, taste, proximity and also the strong growth in vegetarianism, the high demand for plant-based meat analogues rich in protein, the religious considerations having a significant impact in the development of prepared plant food and the increase in the launching of products to cover metabolic diseases and allergies such as lactose or cow's milk protein and gluten intolerance. In the frame of the **Mediterranean diet**, which is considered one of the most beneficial to human health, LOCALNUTLEG alternative-protein and plant-based products will also help to re-design traditional Mediterranean recipes in order to satisfy the above-mentioned consumers' demands.





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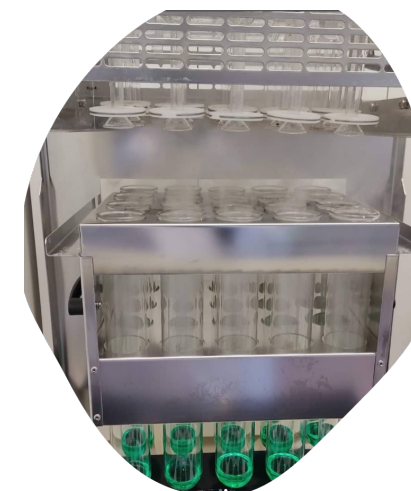
Nutritional Composition (Carambola Nacional)		L100g - Fresh Weight (Less Press)	
Moisture (Water)	78.00	Moisture (Water)	78.00
Carbohydrate (Hexose or Cucose)	21.00	Carbohydrate (Hexose or Cucose)	21.00
Fiber (Ligno)	2.00	Fiber (Ligno)	2.00
Protein (Proteina)	2.00	Protein (Proteina)	2.00
Fat (Lipidios)	0.00	Fat (Lipidios)	0.00

Benefits

- Energy source
- Highly absorbable fat
- Source of vitamins B1, B2 and E3 and minerals: Fe, Mg, Ca
- Source of antioxidants, such as phenolic compounds and polyphenols
- Low glycaemic index
- Low sodium salt
- Low cholesterol

Benefits

- Rich in energy
- Highly absorbable fat
- High in minerals: B1, B2 and E3 and minerals: Fe, Mg, Ca
- Rich in antioxidants, such as phenolic compounds
- Low glycaemic index
- Low sodium salt
- Low cholesterol



IPB, partner of LOCALNUTLEG and WP1 leader, is analyzing the chemical and nutritional properties of local Mediterranean nuts and legumes



Provide a complete nutritional and biochemical portfolio of 60 identified local nut and legume crops with PDO/PGI/autochthonous identity from participating Mediterranean countries to be valorised as raw food ingredient for further development of innovative plant-based products





Species	Code	Legume cultivar	Origin
<i>Lupinus sp.</i>	1	<i>Lupinus albus</i> Local cultivars angus	France
	2	<i>Lupinus albus</i> Local cultivars feodora	France
	3	<i>Lupinus albus</i> Local cultivars sulimo	France
	4	<i>Lupinus albus</i> Local cultivars energy	France
	5	<i>Lupinus albus</i> Local cultivars magnus	France
	6	<i>Lupinus albus</i> Local cultivars ulyse	France
	7	<i>Lupinus albus</i> Local cultivars figaro	France
	8	<i>Lupinus albus</i> Local cultivars orus	France
	ISR1	<i>Lupinus pilosus</i>	Israel
<i>Phaseolus vulgaris</i>	9	PDO Fesols de Santa Pau	Spain
	10	PDO Mongeta del Ganxet	Spain
	11	PGI Faba Asturiana	Spain
	12	PGI Alubia la Bañeza-León ("pinta")	Spain
	13	PGI Alubia la Bañeza-León ("plancheta")	Spain
	14	PGI Judías del Barco de Ávila	Spain
	15	Local landrace Castellfolit del Boix	Spain
	16	Local landrace Genoll de Crist	Spain
<i>Vicia Faba</i>	17	Haba Fabiola	Spain
	18	Haba Sofia	Spain
<i>Cicer arietinum</i>	19	PGI Garbanzo de Escacena	Spain
	20	PGI Garbanzo de Fuentesauco	Spain
	21	Local landrace Cigronet de l'Anoia	Spain
	22	Kochbashi variety from Mid Anatolia	Turkey
<i>Lens culinaris</i>	23	PGI Lenteja de Arnuña	Spain
	24	PGI Lenteja de Tierra de Campos	Spain
<i>Pisum sativum</i>	25	Local landrace pèsol Negre del Berguedà	Spain
<i>Ceratonia siliqua</i>	26	Populations from Catalonia	Spain
	27	Populations from Mallorca	Spain
	ISR2	Whole pods	Israel
	ISR3	Whole pods without seeds	Israel
	ISR4	Seeds	Israel

Species	Code	Legume cultivar	Sample characteristics	Origin	
<i>Prunus dulcis</i>	28	PGI Almendra de Mallorca	Samples with skin	Spain	
	29	PGI Almendra de Mallorca	Samples without skin	Spain	
	30	Local landraces Marcona	Samples with skin	Spain	
	31	Local landraces Marcona	Samples without skin	Spain	
	32	Local landraces Llargueta	Samples with skin	Spain	
	33	Local landraces Llargueta	Samples without skin	Spain	
	34	Local landraces Vairo	Samples with skin	Spain	
	35	Local landraces Vairo	Samples without skin	Spain	
	36	Local landraces Guara	Samples with skin	Spain	
	37	Local landraces Guara	Samples without skin	Spain	
	38	Local almonds plein	Samples with skin	Morocco	
	39	Local almonds espoir	Samples with skin	Morocco	
	40	Local almonds atouch	Samples with skin	Morocco	
	41	Lauranne Amandes 2020	Samples with skin	France	
	42	Lauranne Amandes 2021	Samples with skin	France	
	43	Lauranne Cooperative La Melba	Samples with skin	France	
	44	Ferragnes Amandes 2020	Samples with skin	France	
	45	Ferragnes Amandes 2021	Samples with skin	France	
	46	Soleta Cooperative La Melba	Samples with skin	France	
	47	Vairo Cooperative La Melba	Samples with skin	France	
	48	Marinada Occitanie region	Samples with skin	France	
	49	Guara Occitanie region	Samples with skin	France	
	50	Ferragnes Occitanie region	Samples with skin	France	
		ISR5	NP25	Samples with skin	Israel
		ISR6	Um-Elfahem	Samples with skin	Israel
	<i>Corylus avellana</i>	51	PDO Avellana de Reus	Samples with skin	Spain
		52	Local landrace Comuna	Samples with skin	Spain
		53	PDO Giresun kalite	Samples with skin	Turkey
		54	PDO Levant kalite types	Samples with skin	Turkey
		55	Local landrace Ecological Tarragona	Samples with skin	Spain
	<i>Castanea sp</i>	56	Osmanoglu	Samples with skin	Turkey
		57	Mahmutmolla	Samples with skin	Turkey

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	7	<i>Lupinus albus</i> Local cultivars figaro	France
	8	<i>Lupinus albus</i> Local cultivars orus	France
<i>Phaseolus vulgaris</i>	ISR1	<i>Lupinus pilosus</i>	Israel
	9	PDO Fesols de Santa Pau	Spain
	10	PDO Mongeta del Ganxet	Spain
	11	PGI Faba Asturiana	Spain
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	13	PGI Alubia la Bañeza-León ("plancheta")	Spain
	14	PGI Judias del Barco de Ávila	Spain
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<i>Lens culinaris</i>	22	Kochbashi variety from Mid Anatolia	Turkey
	23	PGI Lenteja de Armuña	Spain
<i>Pisum sativum</i>	24	PGI Lenteja de Tierra de Campos	Spain
	25	Local landrace pèsol Negre del Berguedà	Spain
<i>Ceratonía siliqua</i>	26	Populations from Catalonia	Spain
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	ISR2	Whole pods	Israel
	ISR3	Whole pods without seeds	Israel
	ISR4	Seeds	Israel

Species	Code	Centesimal composition (g/100g FW)						TE
		MC	PC	CF	TMC	DF	CC	
<i>Lupinus sp.</i>	1	4.5 ± 0.4	25.5 ± 1.7	3.7 ± 0.5	3.04 ± 0.04	12.8 ± 0.2	63.2 ± 2.5	417.0 ± 0.6
	2	5.4 ± 0.2	24.6 ± 0.7	4.7 ± 0.3	3.24 ± 0.04	12.4 ± 0.7	62.1 ± 0.3	414.6 ± 1.0
	3	5.2 ± 0.2	29.7 ± 1.6	5.0 ± 0.9	3.18 ± 0.04	12.3 ± 0.2	57 ± 1	416.4 ± 4.2
	4	6.4 ± 0.2	28.3 ± 0.5	4.4 ± 0.5	3.18 ± 0.02	15.1 ± 0.1	57.8 ± 0.8	408.7 ± 3.5
	5	4.5 ± 0.3	25.5 ± 1.7	4.5 ± 0.1	3.1 ± 0.09	14.1 ± 0.9	62.9 ± 0.3	422.2 ± 1.2
	6	4.3 ± 0.1	23.04 ± 0.02	4.2 ± 0.3	3.33 ± 0.24	11.1 ± 0.6	65.1 ± 0.5	418.9 ± 1.7
	7	4.9 ± 0.1	29.7 ± 1.6	5.5 ± 0.7	3.56 ± 0.06	13.7 ± 0.8	56.3 ± 2.4	415.6 ± 4.4
	8	5.1 ± 0.1	22.5 ± 0.1	3.5 ± 0.1	3.5 ± 0.02	12.8 ± 0.2	65.41 ± 0.02	410.7 ± 2.2
<i>Phaseolus vulgaris</i>	ISR1	6.83 ± 0.1	23.5 ± 0.4	5.0 ± 0.1	3.4 ± 0.1	56.9 ± 1.2	61.3	498
	9	10.0 ± 0.4	22.4 ± 0.1	1.4 ± 0.1	4.3 ± 0.1	10.9 ± 0.5	61.9 ± 0.7	372 ± 3
	10	11.2 ± 0.4	23.8 ± 0.2	0.65 ± 0.04	3.9 ± 0.1	12.7 ± 1.0	60.5 ± 0.6	369 ± 1
	11	12.3 ± 0.3	20.9 ± 0.1	0.8 ± 0.1	3.7 ± 0.2	9.4 ± 0.4	62.3 ± 0.3	359 ± 1
	12	11.9 ± 0.4	21.5 ± 0.1	0.75 ± 0.04	4.3 ± 0.4	11.0 ± 0.3	61.6 ± 0.9	361 ± 3
	13	12.5 ± 0.3	20.5 ± 0.5	1.5 ± 0.2	3.8 ± 0.1	12.1 ± 0.4	61.9 ± 0.1	367 ± 3
	14	11.8 ± 0.2	22.0 ± 0.1	0.9 ± 0.1	4.0 ± 0.2	14.0 ± 0.4	61.4 ± 0.4	370 ± 3
	15	11.9 ± 0.4	20.7 ± 0.4	1.9 ± 0.1	4.0 ± 0.1	13.5 ± 0.5	61.5 ± 0.1	373 ± 4
<i>Vicia Faba</i>	16	12.8 ± 0.3	19.9 ± 0.1	1.2 ± 0.1	3.8 ± 0.1	13.8 ± 0.1	62.4 ± 0.3	367 ± 2
	17	10.0 ± 0.3	21.6 ± 0.2	1.3 ± 0.1	3.2 ± 0.4	8.5 ± 0.2	63.9 ± 0.3	371 ± 3
<i>Cicer arietinum</i>	18	10.7 ± 0.2	21.5 ± 0.9	1.7 ± 0.1	3.1 ± 0.2	7.8 ± 0.3	63.0 ± 1.2	369 ± 1
	19	10.3 ± 0.4	20.7 ± 0.1	5.0 ± 0.1	3.1 ± 0.1	17.0 ± 0.9	61.1 ± 0.4	405 ± 1
	20	11.3 ± 0.2	20.1 ± 0.2	4.5 ± 0.1	2.8 ± 0.1	16.1 ± 0.4	61.3 ± 0.6	398 ± 2
	21	10.4 ± 0.3	21.7 ± 0.1	3.4 ± 0.1	2.8 ± 0.3	15.6 ± 0.2	61.7 ± 0.3	395 ± 1
<i>Lens culinaris</i>	22	10.3 ± 0.2	19.8 ± 0.2	4.2 ± 0.3	2.9 ± 0.1	16.2 ± 0.5	62.9 ± 0.3	401 ± 3
	23	11.5 ± 0.1	24.3 ± 0.5	1.0 ± 0.1	3.0 ± 0.1	9.2 ± 0.3	60.3 ± 0.7	365 ± 1
<i>Pisum sativum</i>	24	10.9 ± 0.1	21.0 ± 0.4	0.65 ± 0.03	2.1 ± 0.1	8.3 ± 0.5	65.4 ± 0.5	368 ± 1
	25	14.1 ± 0.4	18.8 ± 0.4	0.9 ± 0.1	4.0 ± 0.2	4.7 ± 0.5	62.3 ± 0.1	341 ± 4
<i>Ceratonía siliqua</i>	26	13.4 ± 0.1	1.7 ± 0.1	0.38 ± 0.03	3.1 ± 0.1	11.7 ± 0.3	81.57 ± 0.03	359.6 ± 0.1
	27	13.3 ± 0.2	1.33 ± 0.02	0.29 ± 0.03	2.9 ± 0.1	11.6 ± 0.2	82.2 ± 0.2	360 ± 1
	ISR2	7.2 ± 0.1	5.6 ± 0.1	2.8 ± 0.1	2.85 ± 0.01	28.8 ± 0.6	81.55	431.40
	ISR3	6.48 ± 0.03	4.3 ± 0.1	1.9 ± 0.1	2.83 ± 0.01	23.3 ± 1.9	81.51	407.01
	ISR4	4.64 ± 0.04	13.5 ± 0.3	6.13 ± 0.03	4.8 ± 0.1	58.2 ± 0.6	68.93	501.29

MC: Moisture content; PC: Protein content; CF: Crude fats; TMC: Total Mineral Content; DF: Dietary fibre; CC: carbohydrate content; TE: Total Energy

Centesimal composition, individual profile of sugars, total saturated, monosaturated and polyunsaturated fatty acids, individual profiles of fatty acids, mineral content, organic acids, tocopherols, phenolic compounds..



BEANS

PDO "Fesols De Santa Pau"

Mediterranean region
Spain

The PDO Fesols de Santa Pau aims to distinguish and protect the seeds of beans (*Phaseolus vulgaris* L.) from traditional varieties, produced in volcanic soils of the Garrutxa region.

GEOGRAPHIC AREA
 Produced and processed in the municipalities of Santa Pau (main centre of production), Castellfollit de la Roca, Les Planes d'Hostoles, Les Preses, Olot, Sant Feliu de Pallarès and Sant Joan les Fonts (all in the district of Garrutxa, in the Autonomous Community of Catalonia, in north-eastern Spain).

VARIETIES
 Tavella Brava, Setsetmanera and Gra Petit.

SOWING: May;
FLOWERING: June;
HARVEST: September -October.

COMMERCIALIZATION
 Dried and cooked.

CHARACTERISTICS

- Dried beans are white and rounded, and have a small size;
- Smooth skin which is only slightly perceptible;
- Buttery texture when cooked.

TRADITIONAL DISHES

- Meat and sea dishes (ex: fesols a la marinera; fesols with cuttlefish; fesols with butifarra espurracada or cansalada).

More information: <https://fesolsdesantapau.cat/>

PEAS

Mediterranean region
Italy

GEOGRAPHIC AREA
 Italian main production areas of peas are located in the central northern regions. For example, the peas "a mezza frasca aretino" and "a tutta frasca aretino" are traditional varieties from the province of Arezzo, region of Tuscany.

PRODUCTION
 Sowing: November
 Pod development: late March and April
 Harvest: late May
 Culture requires sandy soils and does not need phytosanitary interventions.

CHARACTERISTICS
 For best flavor, the pods are harvested when are plump but not bulging. Depending on the variety, seeds may be light green or yellow. Usually they are quite small, sweet, smooth, and tender.

GASTRONOMY
 In Italy, it is traditional to cook lamb with peas on Easter Sunday, when the whole family gathers to celebrate one of the most important religious feasts of the year.

CAROB

Mediterranean region
SPAIN

FLOWERING
 New inflorescences may appear before harvesting the fruit.

POLLINATION
 Pollination occurs by wind or insects.

HARVEST
 It is often done by knocking the fruit down with a long stick and gathering them together with the help of laid-out nets.

SPANISH CULTIVARS*
 Negra: short, straight and darker,
 Rojal: long, curved and reddish,
 Duraio: medium and straight,
 Banya de cabra: long and twisted.

* Pod size, shape and colour

CONSTITUENTS
 The carob pod constituents are pulp (90%) and seed (10%). The seed consists of germ, endosperm and husk.

USES
Pulp - Animal feed, food ingredient, cacao substitute, extraction compounds (e.g., sugar);
Seed - food additive (stabilizer and thickener), pharmaceuticals, cosmetics.



BEANS LOCALNUTLEG

PEAS LOCALNUTLEG

CAROB LOCALNUTLEG

PDO "Fesols De Santa Pau"

Mediterranean region

Mediterranean region

SPAIN

https://localnutleg.eu/infographics/

PROJECT PARTNERS MULTIMEDIA GALLERY DISSEMINATION CONTACTS


INFOGRAPHICS

https://localnutleg.eu

- Portugal - Chestnut
- Spain - Beans PDO Fesols de Santa Pau
- Spain - Hazelnut
- Spain - Beans PDO Mongeta del Ganxet
- Spain - Beans Castellfollit del Boix
- Spain - Carob







LOCALNUTLEG

Booklet

LOCALNUTLEG
LOCAL Mediterranean NUTs and
LEGumes |
Frutos secos e leguminosas locais
Mediterrânicos


www.localnutleg.eu



FRANCE FRANÇA

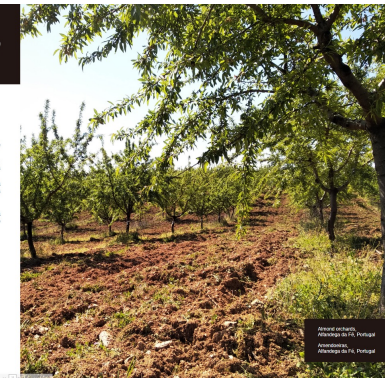
Laurène

Description

Obtained by INRA (France) crossing "Féragrac" x "Tunzi".
Laurène is a variety self-fertile and late flowering. Since the tree is very productive, the almonds are often a little small.
The fruit has a semichard shell, elongated and narrow seed, kernel yield is 35-38% and double fruits less than 2%. It is sweet, crunchy with a bit of bitterness.
The main market segments are confectionery (coating, praline), magals, "dragées", "cassonets" and biscuits.

Description

Obtida pelo INRA (França) através do cruzamento entre as variedades "Féragrac" e "Tunzi".
Laurène é uma variedade auto-fértil e de floração tardia. Uma vez que a árvore é muito produtiva, as amêndoas são muitas vezes um pouco pequenas.
O fruto tem uma casca semi-dura, semente alongada e estreita, rendimento da semente é 35-38 % e frutos duplos inferiores a 2%.
É doce, crocante, com um pouco de amargor.
Os principais segmentos de mercado são a confeitaria (envelhecimento, praline), magals, "dragées", "cassonets" e biscoitos.



FRANCE FRANÇA

Ferrogas

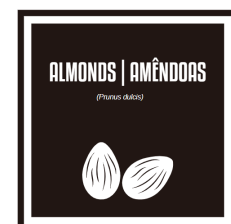
Description

Obtained by INRA (France) crossing "Féragrac" x "Cassonnet" x "M".
It is self-sterile and is pollinated with "Féragrac" and other varieties with a late blooming.
The fruit is strong and compressed with a sweet taste, hard-shelled, yield is 40%, and rate of double almonds is 1.2%.
The fruit can be eaten raw or roasted.

Description

Obtida pelo INRA (França) através do cruzamento entre as variedades "Cassonnet" e "M".
É auto-estéril e é polinizada com "Féragrac" e outras variedades de floração tardia.
O fruto é robusto e comprimido com sabor doce, tem casca dura, rendimento de 40% e taxa de amêndoas duplas é de 1,2%.
A fruta pode ser consumida crua ou assada.

French Producers
Producteurs Français



Nutritional Composition | Composição Nutricional

	g/100g - Fresh weight peso fresco
Moisture Humidade	2 - 5
Carbohydrates Hidratos de Carbono	21 - 31
Fiber Fibra	23 - 31
Protein Proteína	21 - 31
Fat Gordura	43 - 55

Benefits

- Energy source
- Many unsaturated fat
- Source of vitamins (B2, B6 and E) and minerals (Mg, Mn, P)
- Source of antioxidants, such as phenolic acids and polyphenols
- Low glycemic index
- Cholesterol free
- Almond with skin richer in fiber

Benefícios

- Fonte de energia
- Muitamente gordura insaturada
- Fonte de vitaminas (B2, B6 e E) e minerais (Mg, Mn, P)
- Fonte de antioxidantes, tais como ácidos fenólicos e fitoquímicos
- Baixo índice glicémico
- Sem colesterol
- Amêndoas com pele rica em fibra

Traditional Mediterranean recipes
Receitas tradicionais Mediterrâneas



Nutritional composition, health benefits, description of local landrace, curiosities (history and traditional dishes)

English, Spanish, Catalan, French, German, Hebrew, Italian, Turkish and Portuguese



LOCALNUTLEG

Developing innovative plant-based added-value food products through the promotion of LOCAL Mediterranean NUT and LEGUME crops
 PRIMA S1 2020 AGROFOOD VALUE CHAIN. PRIMA SECTION 1 (IA) Valorising the health benefits of Traditional Mediterranean food products. Grant Agreement n° 2023.

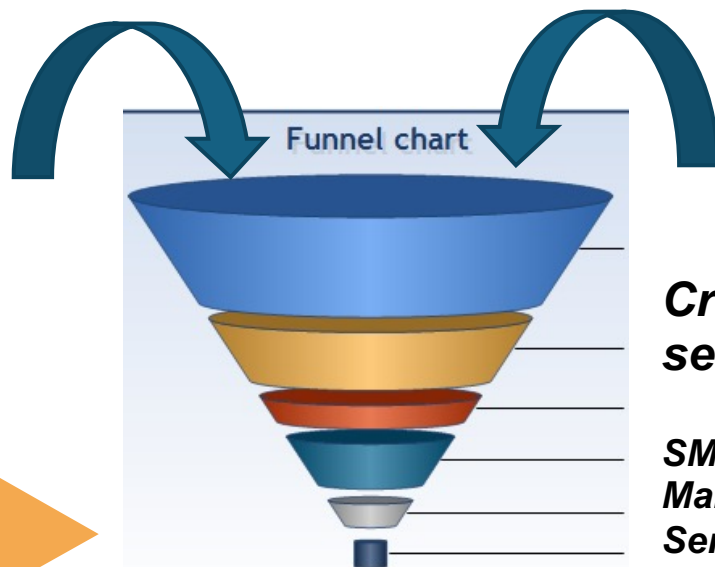


To produce innovate and healthy plant-based food products using Mediterranean nuts and legumes with PDO/PGI trademark or autochthonous identity



To increase the range of local nut and legume-based products at Mediterranean level

From the **20/22 PLANNED PROTOTYPES** within LOCALNUTLEG, at least **SEVEN CASE STUDIES** were selected on the basis of an initial screening of the products using the sensory acceptance criteria and the **REPRESENTATION** of the SMEs amongst the consortium



More than 80 products

Criteria of final selection

**SME
 Market potential
 Sensory**

22

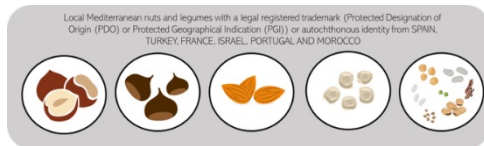


Trained Panel



7 Consumers Study





Task 2.2. Fermented probiotic plant-based beverages (M17-M22).

Task 2.3. Yogurt-type fermented probiotic gels (M23-M28).

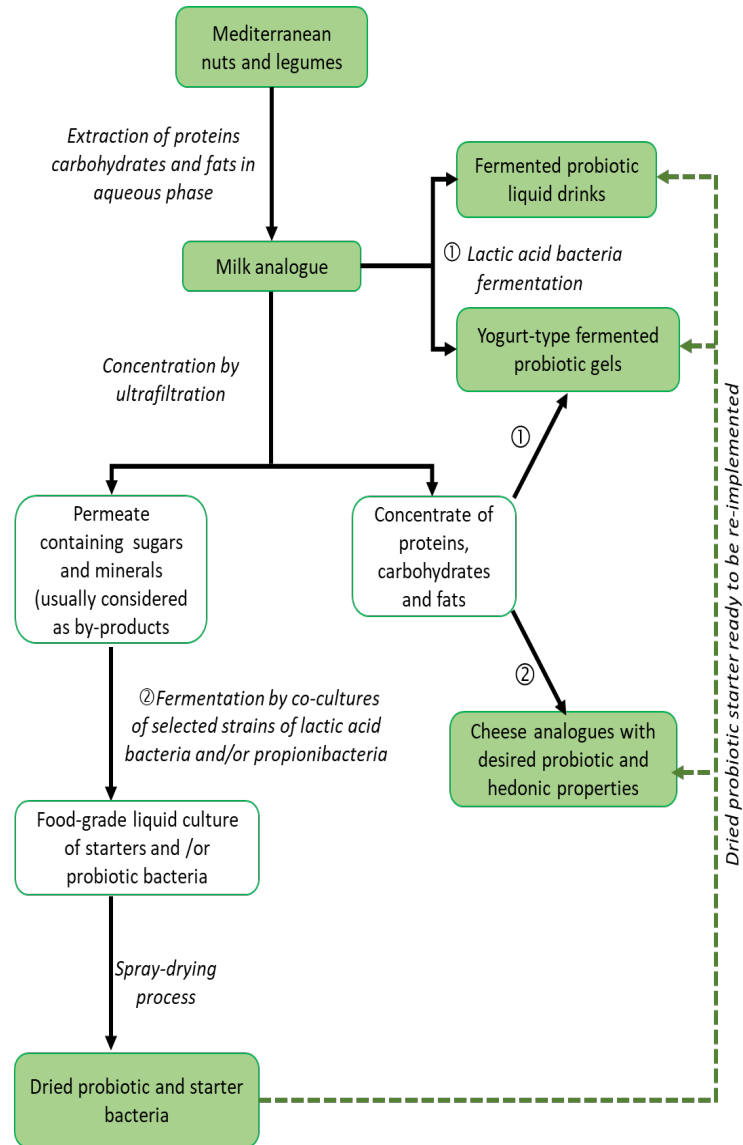
Task 2.4. Plant-based cheese analogues (M29-M34).

Task 2.5. Production and drying of added-value probiotic and/or starter powders (M17-M31).

Task 2.6. Assessment of consumer acceptability (M19-M34).

Task 2.7 Elaboration of the fermented plant-based products by the SMEs (M23- M42).

Task 2.8 Dissemination actions (M1-M42).





WP 2. Innovative Plant-based dairy analogues



Fermented almond beverages



LAB
PAB strains

High level of immune properties *in vitro*

Yogurt-type fermented probiotic gel

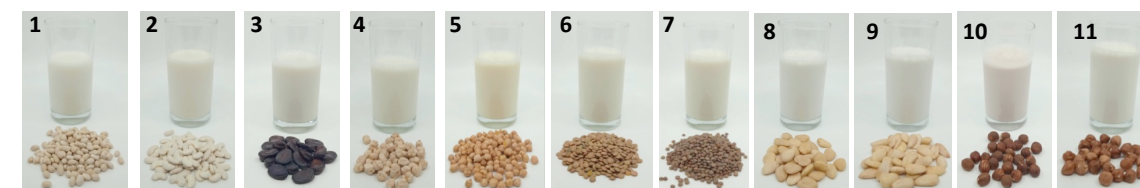
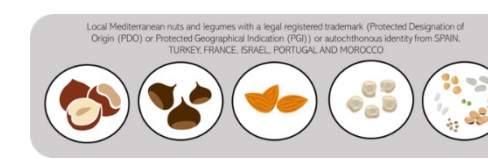
Enrichment of almond milk with ChickP (target 4% of protein)

No protein precipitation after heat treatment

Firm gel with low syneresis after fermentation

Need to add sucrose (2.5%) so that the strain can acidify enough (pH 4,5)

Sweet, slightly acidic, milky/yogurt taste
level of immune properties *in vitro*

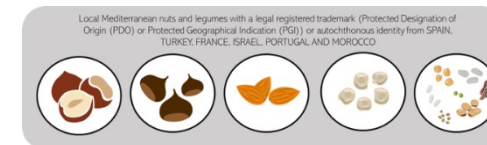


Legume and nut-based beverages

	100% Almond	75% Almond 25% Chickpea	50% Almond 50% Chickpea	25% Almond 75% Chickpea	100% Chickpea
Appearance of the gel					
Appearance of the gel in the spoon					



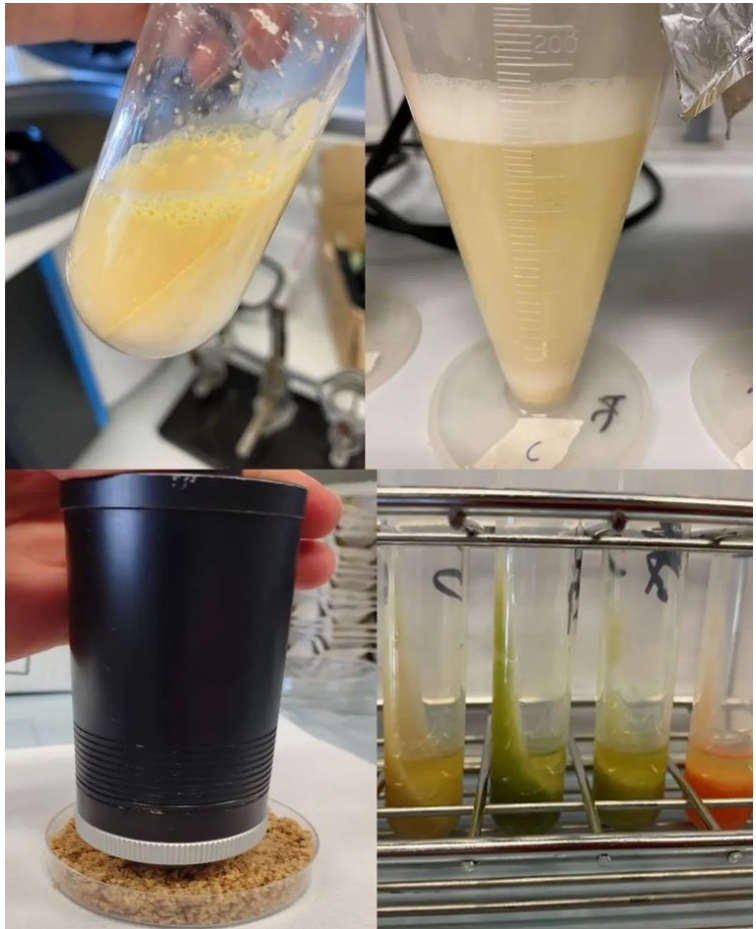
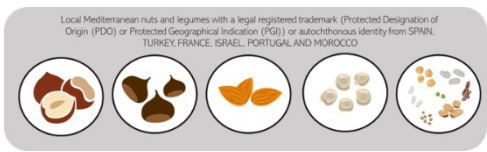
WP 3. Potential plant-based flours and validation for bakery products and pasta



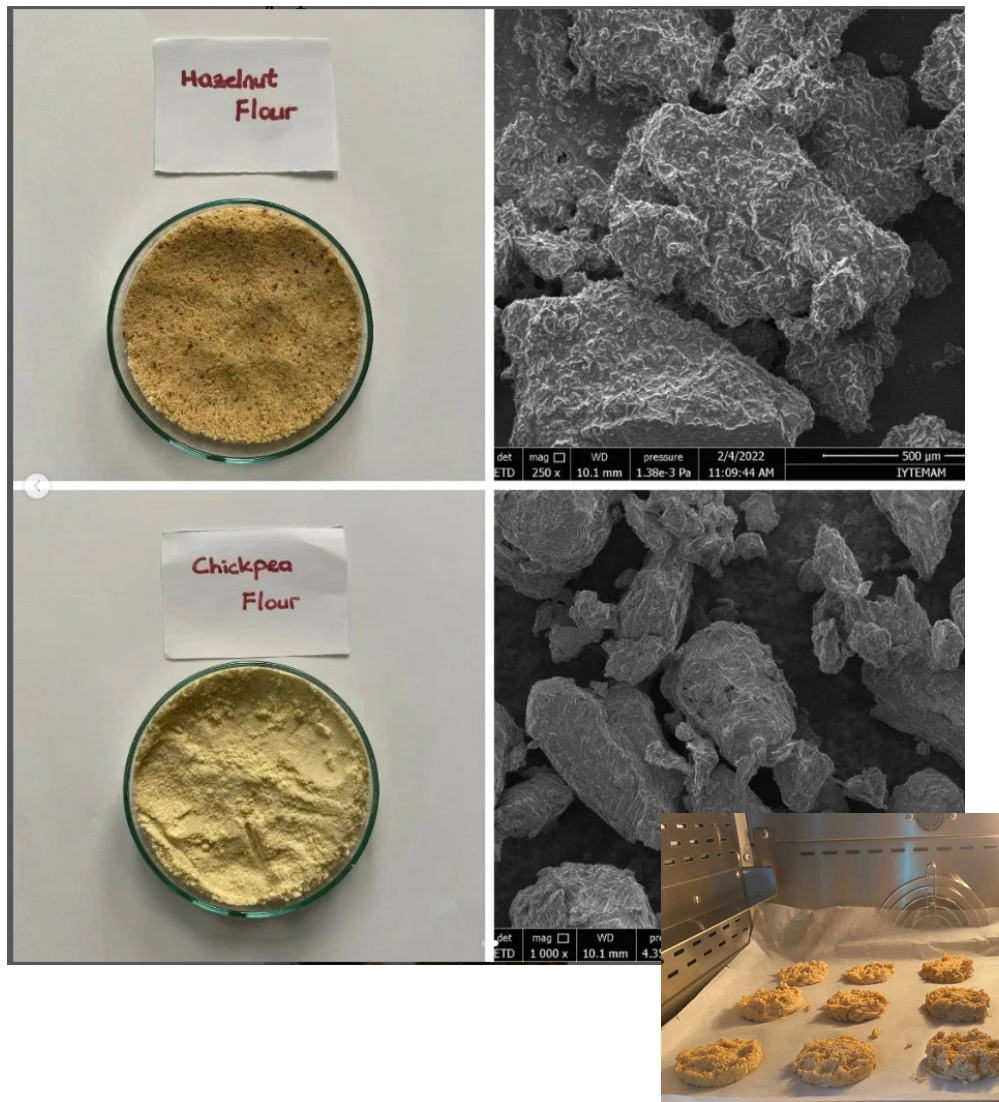
Partner	Supplier	Flour	Species
BUU	Turkish local supplier	Mahmut Molla chestnut	<i>Castanea</i> Mahmut Molla
BUU	Turkish local supplier	Osmanoglu chestnut	<i>Castanea</i> Osmanoglu
BUU	Gluno Glutensiz	Chestnut	<i>Castanea sp.</i> grown in Aydın region
IRTA	IRTA	Chickpea	<i>Cicer arietinum</i> Local landrace Cigronet de l'Anoia
IZTECH	Ingro	Pre-cooked white bean	<i>Phaseolus vulgaris</i> Dermason type grown in Turkey
IZTECH	Ingro	Carob	<i>Ceratonia siliqua</i> Turkish fleshy type
IZTECH	Naturelka	Carob	<i>Ceratonia siliqua</i> Turkish fleshy type
IZTECH	Ingro	Pre-cooked chickpea	<i>Cicer arietinum</i> Kochbashi variety from Mid Anatolia
IZTECH	UKKOP	Pre-cooked chickpea	<i>Cicer arietinum</i> Kochbashi variety from Mid Anatolia
IZTECH	Naturelka	Pre-cooked chickpea	<i>Cicer arietinum</i> Kochbashi variety from Mid Anatolia
IZTECH	Ingro	Hazelnut	<i>Corylus avellana</i> PDO Levant kalite
THC	ARO	Almond	<i>Prunus dulcis</i> Nonpareil
THC	ARO	Almond	<i>Prunus dulcis</i> Um El-Fahem
THC	ARO	Carob	<i>Ceratonia siliqua</i> grown in Israel
THC	ARO	Lupin	<i>Lupinus pilosus</i> grown in Israel

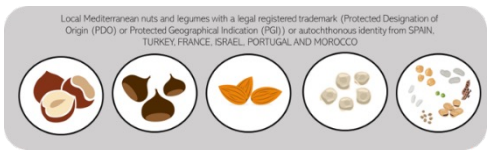
Partner	Supplier	Flour	Species
UMIL	LM	Pre-cooked green lentil	<i>Lens culinaris</i>
UMIL	Martino Rossi SpA	Chickpea flour	<i>Cicer arietinum</i> grown in Italy
UMIL	Martino Rossi SpA	Heat-treated chickpea	<i>Cicer arietinum</i> grown in Italy
UMIL	Martino Rossi SpA	Red lentil	<i>Lens culinaris</i> grown in Italy
UMIL	Martino Rossi SpA	Heat-treated red lentil	<i>Lens culinaris</i> grown in Italy
UMIL	Martino Rossi SpA	Green pea	<i>Pisum sativum</i> grown in Italy
UMIL	Martino Rossi SpA	Heat-treated green pea	<i>Pisum sativum</i> grown in Italy
UMIL	LM	Chestnut	<i>Castanea sp.</i> grown in Italy
UMIL	LM	Defatted almond	<i>Prunus dulcis sp.</i> grown in Mediterranean area
UMIL	LM	Defatted hazelnut	<i>Corylus avellana sp.</i> grown in Mediterranean area
UMIL	UNIO	Hazelnut	<i>Corylus avellana</i> PDO Avellana de Reus
UMIL	UNIO	Roasted hazelnut	<i>Corylus avellana</i> PDO Avellana de Reus
UMIL	UNIO	Defatted hazelnut	<i>Corylus avellana</i> PDO Avellana de Reus and Local landrace Comuna
UMIL	UNIO	Partially defatted roasted hazelnut	<i>Corylus avellana</i> PDO Avellana de Reus and Local landrace Comuna
SORTEGEL	SORTEGEL	High-quality chestnut flour	<i>Castanea</i> PDO Terra Fria grown in Portugal
SORTEGEL	SORTEGEL	Low-quality chestnut flour	<i>Castanea</i> PDO Terra Fria grown in Portugal

WP 3. Potential plant-based flours and validation for bakery products and pasta



University of Milan (UMIL), partner leader of WP3, performing technological analysis (e.g., color analysis, foaming capacity, oil absorption capacity and water retention capacity) in legumes and nut flours, in order to evaluate the potential plant-based flours.





RAW CHICKPEA FLOUR

Origin: Italy
Supplier: Martino Rossi SpA
Partner in charge of characterisation: UMIL

GROSS COMPOSITION PER 100g	
Moisture	3.7 g
Protein	22.2 g
Fat	5.1 g
Carbohydrates	66 g

TECHNOLOGICAL PROPERTIES

Trade name	Nativia chickpea flour	
Code	C	
Bulk density (g/mL)	0.63 ± 0.01	
Water retention capacity (%)	151 ± 4	
Oil absorption capacity (mL/g)	1.08 ± 0.04	
Emulsifying activity (%)	43.8 ± 0.6	
Emulsifying stability after 30 min (%)	93 ± 7	
Foaming capacity (%)	19 ± 3	
Foam stability after 60 min (%)	11 ± 2	
Colour	L*	88.8 ± 0.6
	a*	-4.4 ± 0.2
	b*	27.1 ± 0.7



cookies with chickpea and hazelnut flour (IZTECH)



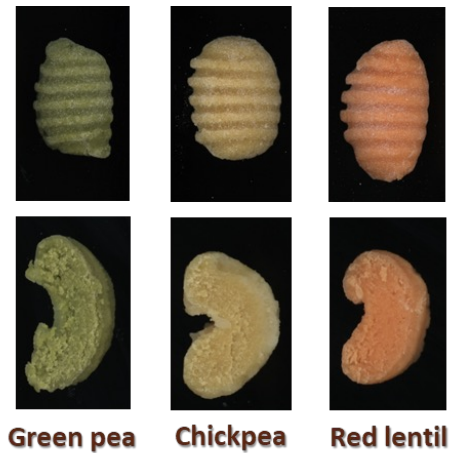
yeast-free bread with white bean and hazelnut flour (IZTECH)



gluten-free bread: standard (up); with bean flour (down) (IZTECH-UMIL)

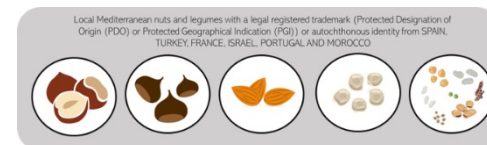


Cooked gnocchi



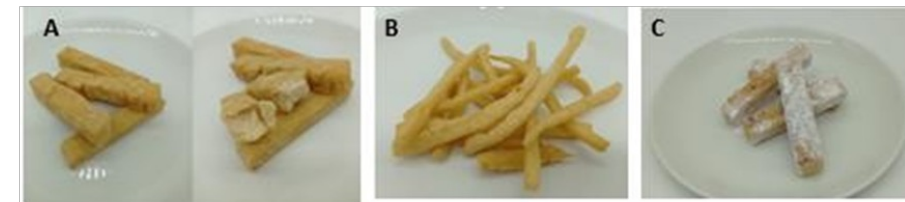
Green pea Chickpea Red lentil

The PRIMA programme is supported and funded under Horizon 2020, the Framework European Union's Programme for Research and Innovation

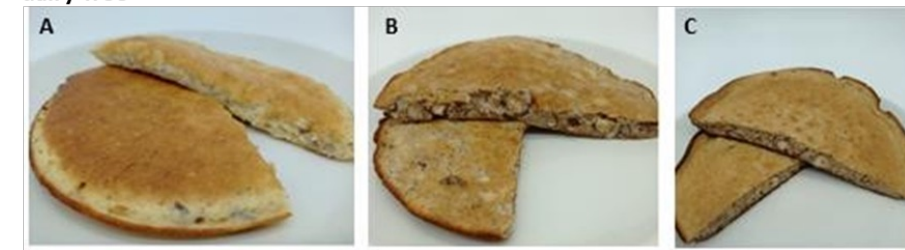


Number	Partner	Product	Shelf-life
1	IRTA	Chickpea fried bread (Panisses frites)	The shelf-life was estimated at 45 days. The product was vacuum packed in polypropylene bags and stored at refrigerated temperatures (4°C).
2	IRTA	Hazelnut omelette	The shelf-life was estimated at 30 days. The product was vacuum packed in polypropylene bags and stored at refrigerated temperatures (4°C).
3	IRTA	Portuguese chestnut pudding	The shelf-life was estimated at 30 days. The product was packaged in 250 mL aluminium containers and stored at refrigerated temperatures (4°C).
4	IRTA	Egg-free potato omelette	The shelf-life was estimated at 30 days. The product was vacuum packed in polypropylene bags and stored at refrigerated temperatures (4°C).
5	IRTA	Romesco sauce	The shelf-life was estimated at 1 year. The product was packaged in 250 mL glass jars at room temperature.
6	IRTA	Legume sweet spread	The shelf-life was estimated at 1 year. The product was packaged in 250 mL glass jars at room temperature.
7	IRTA	Legume salty spread	The shelf-life was estimated at 1 year. The product was packaged in 250 mL glass jars at room temperature.
8	UNPA	Traditional Keşkül	The shelf-life was estimated at 3 days in aluminium bags, covered and left in cooling racks (4 °C).
9	UNPA	Gluten-free Keşkül	The shelf-life was estimated at 3 days in aluminium bags, covered and left in cooling racks (4 °C).
10	UKKOP	Vegan artichoke veggie patties	The shelf-life was estimated at 6 months by packed in moisture-proof packaging and closing the mouth with a hot press and stored refrigerated (4°C).
11	UKKOP	Turkish ravioli	The shelf-life was estimated at 2 years by packed in moisture-proof packaging and closing the mouth with a hot press. The product was stored at room temperature.
12	UKKOP	Gluten-free Turkish ravioli	The shelf-life was estimated at 2 years by packed in moisture-proof packaging and closing the mouth with a hot press. The product was stored at room temperature.
13	MORE and SORTEGEL	"Cuscos"	The shelf-life was estimated at 3 months. The cous-cous was stored in bags at room temperature.
14	MORE and SORTEGEL	Chestnut spreadable	The shelf-life was estimated at 5 months. The spreads were packed in glass jars and stored at room temperature in a cool, dry place.
15	UNIO	Spreadable cocoa cream with and without milk	The shelf-life was estimated at 9 months. The product was stored at ambient temperature.
16	UNIO	Pralines hazelnut and almond (50:50)	The shelf-life was estimated at 9 months. The product was stored at ambient temperature.
17	UNIO	Blanched almond paste	The shelf-life was estimated at 6 months. The product was stored at ambient temperature.
18	Ferrer	Hummus with piquillo pepper	The shelf-life was estimated at 2 years. The product was stored in 250 mL glass jars at room temperature.
19	Ferrer	Hummus with truffles	The shelf-life was estimated at 2 years. The product was stored in 250 mL glass jars at room temperature.
20	Ferrer	Hummus de dried tomato with vera's red pepper	The shelf-life was estimated at 2 years. The product was stored in 250 mL glass jars at room temperature.
21	MAI	Almond marzipan figurines	The shelf-life was estimated at 12 months. The products were packed in vacuum bags in cartons and stored at room temperature.
22	MAI	Turrón	The shelf-life was estimated at 20 months. The products were packed in vacuum bags in cartons and stored at room temperature. On-going tests are being conducted to achieve shelf-life of 12 months. The products were packed in food grade bags at room temperature.
23	ChickP	Neutral puffs	On-going tests are being conducted to achieve shelf-life of 12 months. The products were packed in food grade bags at room temperature.
24	ChickP	Coated puffs	On-going tests are being conducted to achieve shelf-life of 12 months. The products were packed in food grade bags at room temperature.
25	THC	Fresh 'Tempos'	The shelf-life was estimated at 2 months in freezing temperature (-18 °C).
26	THC	Sterilized 'Tempos'	The shelf-life was estimated at 6 months in refrigerated storage (4 °C).

Panisses from France. A) Traditional recipe. B) Traditional recipe in the form of crisps. C) Traditional recipe with sugar



Hasselnut omelette from Germany A) Traditional recipe. B) Milk-free. C) Egg-free and dairy-free



Chestnut pudding from Portugal A) Traditional recipe. B) Sugar-free. C) Sugar-free and egg-free





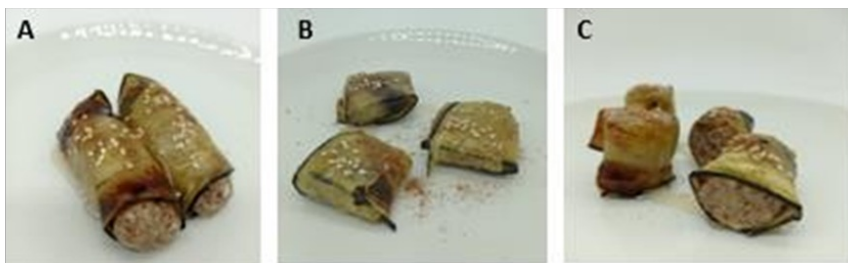
Falafel from Israel A) traditional recipe. B) Traditional recipe only with lupins C) Traditional recipe with hard texture



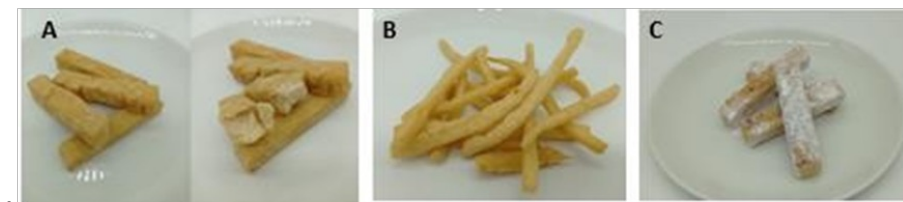
Topik from Turkey A) Traditional recipe. B) Traditional recipe with elongated shape. C) With rice



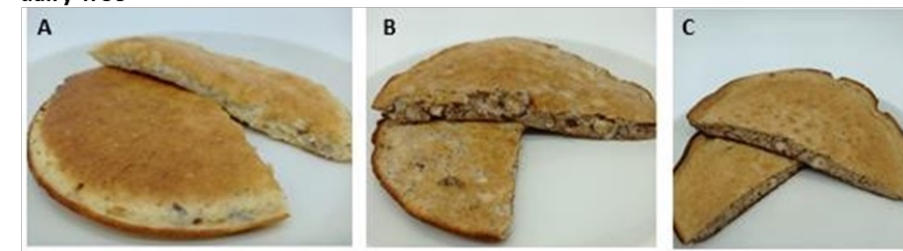
Aubergine rolls stuffed with almonds recipe from Morocco A) Traditional recipe. B) Traditional ravioli recipe. C) With toasted almonds



Panisses from France A) Traditional recipe. B) Traditional recipe in the form of crisps. C) Traditional recipe with sugar



Hasselnut omelette from Germany A) Traditional recipe. B) Milk-free. C) Egg-free and dairy-free



Chestnut pudding from Portugal A) Traditional recipe. B) Sugar-free. C) Sugar-free and egg-free





WP 4. Innovative added-value traditional ready-to-eat meals



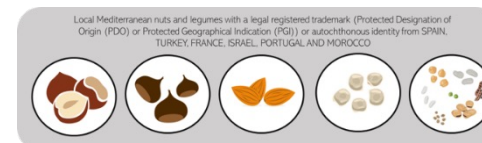
Ivan Pascual
WORLD CHOCOLATE MASTERS
SPAIN 2017-2018



Incorporation of healthy ingredients to complement the recipe



Consumers



- Sweet spreadable texturized 8 %
- Sweet spreadable texturized 10 %
- Romesco spreadable texturized 8 %
- Romesco spreadable texturized 12 %
- Corn spreadable texturized 5 %
- Corn spreadable texturized 8 %



Complete consumer study for corn spreadable



WP 4. Innovative added-value traditional ready-to-eat meals



Interconnection with WP5



Puddim castanha

Sugar

Sugar-free

Sensorial

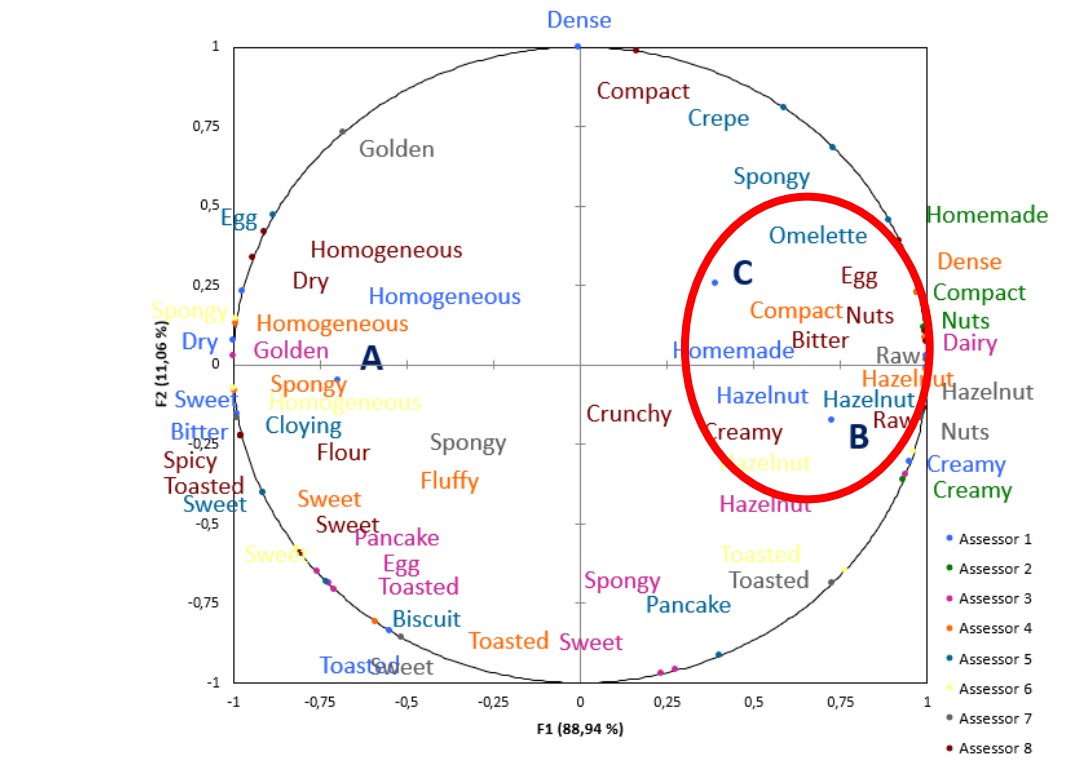
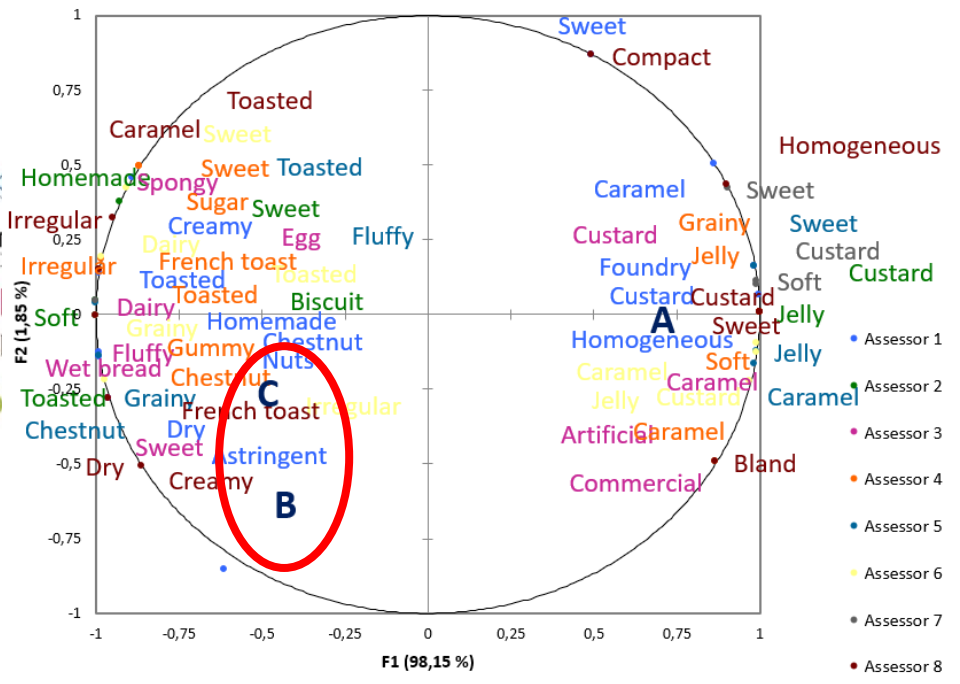
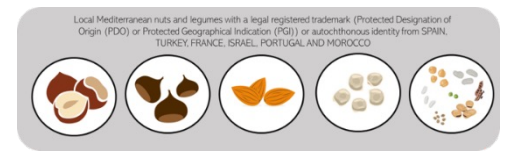


Haselnussomelette

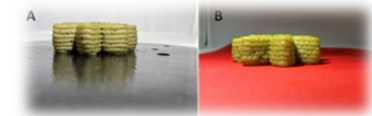
Gluten

Gluten-free

Sensorial



WP 4. Innovative added-value traditional ready-to-eat meals

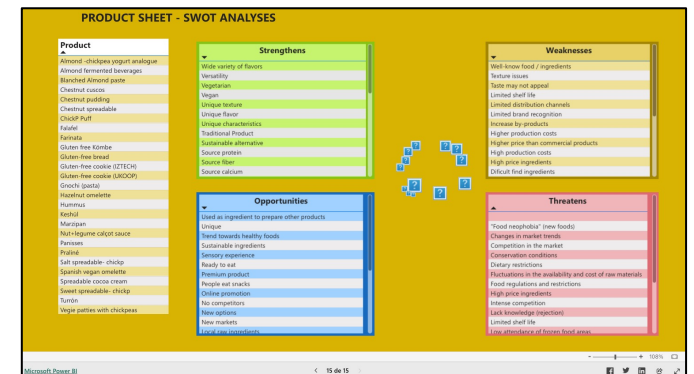
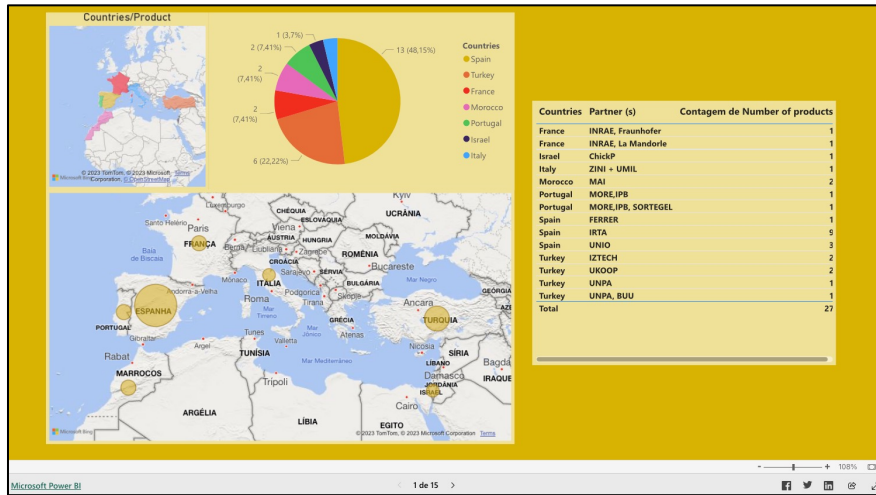


WP 6: Dissemination, Communication and Exploitation Plan

Power BI as a means to explore LocalNutLeg results



The PRIMA programme is supported and funded under Horizon 2020, the Framework European Union's Programme for Research and Innovation



ESTIG/IPB
BRAGANÇA, PT

**INTERNATIONAL
CONFERENCE ON
SUSTAINABLE FOODS**

Achieving the Sustainable
Development Goals

**July
24
25
2024**



The PRIMA programme is supported and funded under Horizon 2020, the Framework European Union's Programme for Research and Innovation

PRIMA
MULTIDISCIPLINARY RESEARCH AND INNOVATION
IN THE MEDITERRANEAN AREA



IRTA^R



ALL ALIMENTARIA 2022 TUTTOFOOD 2023 SIAL 2022 ANUGA 2023 SIEMA FOOD EXPO 2023 ALIMENTARIA 2023





The PRIMA programme is supported and funded under Horizon 2020, the Framework European Union's Programme for Research and Innovation



HAZELNUT SPREADABLE

This product is a food item that contains hazelnut (PDO Avellana de Reus/ cv.'Negreta'), chickpea flour (Local chickpea landrace 'Cigronet de l'Anoia'), peel apple flour, olive oil, Fibersol, and an edulcorant. The functional properties of this product may include providing a source of fiber, healthy fats, and natural sweetness, while potentially being low in sugar and carbohydrates.



Ingredients: Hazelnut (PDO Avellana de Reus/ cv.'Negreta'), chickpea flour (Local chickpea landrace 'Cigronet de l'Anoia'), peel apple flour, olive oil, Fibersol, edulcorant (sucralose).

How to consume: It can be consumed directly or spread on bread.

Nutritional composition:

	g/100g dry matter
Energy (Kcal/100g)	649.3 ± 1.3
Protein	9.73 ± 0.81
Ash	1.67 ± 0.03
Total Fat	25.2 ± 0.28
Total Carbohydrates	57.40 ± 1.5

*DW-Dry matter

Consumers' Willingness to pay: between 2.59 and 2.60€/200g

Production Cost: The production cost is 1.55 per 100 grams

Estimated shelf-life: Estimated shelf-life: 1 year. The product was packaged in 250 mL glass jars at room temperature.

Prioritised commercialisation policies

Product concept		
Daily consumer product (1)	Gourmet product with high-added value (2)	Product for HORECA (3)
Main product claim		
Nutritional value (superfood, no added sugar) (1)	Sustainability (food utilization, local origin) (2)	Vegan or vegetarian product (3)
Target: customers to whom the product is directed		
General consumer (1)	Gourmet Consumer (2)	Vegan and vegetarian consumers (3)
Main promotion strategies		
Social networks (1)	Trade and food fairs (2)	Commercial actions aimed at the general public (3)
Product distribution channels		
Specialized food stores (1)	Supermarkets (2)	Online sale (3)
Price of the product		
Average price (equivalent to analogous products) (1)	Competitive price (lower than similar products) (2)	Premium price (higher than analogous products) (3)

(1) (2) (3) = Ranking (prioritization) elements are most important

Sensory hedonic evaluation: Sensory characteristics

Mean score interpretation: 1-3.00 = Low 🐼🐼🐼
 3.01-6.00 = Moderate 🐼🐼🐼🐼🐼
 6.01-9.00 = High 🐼🐼🐼🐼🐼🐼🐼

Color	Smell	Flavour	Appearance	Texture
🐼	🐼	🐼	🐼	🐼

Global appearance 🐼🐼🐼🐼🐼

Descriptive sensory characteristics:

woody hazelnut	astringent oily	sweet thick
----------------	-----------------	-------------



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PRIMA. An analysis of supply chain and marketing strategies will be carried out in LOCALNUTLEG for the products developed. Lab4supply will contribute in bringing knowledge on how the new business opportunities should be analyzed by involving all stakeholders in the food chain



EU Projects-wild lupins
 Sustainable agro-system: wild lupins as a novel crop in a silvoarable system
 Alkaloid and elemental distribution in seeds of wild *Lupinus pilosus* populations



US Project: Evaluation of the functionality of wild lupine proteins for novel food production



PRIMA. The Pulping project is aimed towards stimulating the entire pumpkin value chain in the Mediterranean region, closely linked with the principles of sustainability and novel processes along the various stages. In that effort, Pulping is well aligned with LocalNutLeg on the promotion of local Mediterranean food products, on the development of innovative plant-based food products under the principles of sustainability and also responding to the consumers' demands for healthiness, proximity, and growth in vegetarianism as well as plant-based analogues



NutriCropRED2022-134382-T

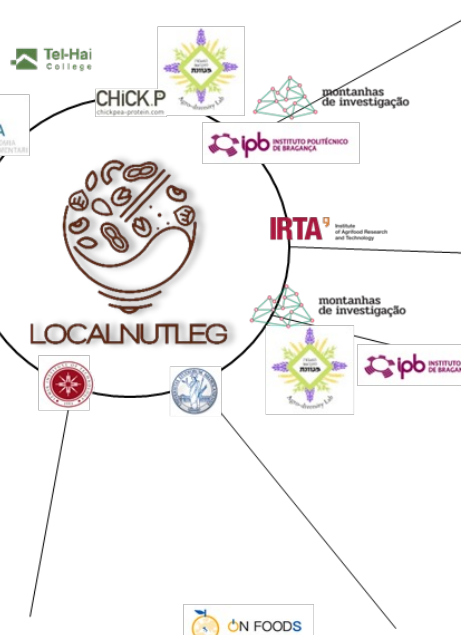
Lancement du projet TRANSLAG par la région Pays de la Loire et INRAE dans le cadre du programme TETRAE (transition protéique)

Paru le 02-03-2023 |

Dans le cadre du programme TETRAE, la région Pays de la Loire et INRAE soutiennent le projet TRANSLAG : Accompagner la transition protéique en Pays de la Loire vers plus de Légumineuses à Graines dans nos assiettes par une approche intégrée.

TRANSLAG TETRAE project (French project), Supporting the protein transition in Pays de la Loire towards more legumes on our plates through an integrated approach that is linked to LocalNutLeg project

Physical, chemical, and spectroscopic properties of doughs and the final product containing vegetable and fruit flours (2021-ITYE-1-0038)



Research and innovation network on food and nutrition Sustainability, Safety and Security – Working ON Foods
 It's a national project. The connection is about the reformulation of food products for healthier and more sustainable diets.

H2020. Alternative protein such as microalgae interacting with alternative vegetable protein for legume.



VALMEDALM – Section 2 Prima
 VALMEDALM aims to empower local almond production of the Mediterranean through the implementation of intercropping practices as an integrated strategy aligned with economic and social aspects, as well as sustainable principles towards an adaptation to climate change. The interaction with LOCALNUTLEG focus on giving feedback to almond producers on valorization strategies for their products, through certification or processing into new food products.



Unlocking Nutritional and Functional Benefits of Fava Beans through Solid-State Fermentation: A Scientific approach

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INTRODUCTION

With the increase in the consumption of vegetable proteins, such as those from legumes, there is a growing need to innovate in their consumption. This entails not only novel preparation and cooking methods but also strategies to fully exploit their intrinsic nutrients. One promising approach could be fermentation [1]. Solid-state fermentation involves inoculating the legume or legumes of interest with one or several microorganisms, among them fungi, yeasts and lactic acid bacteria. Koji (*Aspergillus oryzae*), Tempeh (*Rhizopus oligosporus*), and Oncom (*Neurospora sitophila*) are all traditional fermented foods that utilize fungi to enhance their nutritional value and flavor [2]. The fermentation process not only preserves the food but also boosts its nutritional content. Fungi increases the bioavailability of nutrients, adds beneficial compounds, and often reduces antinutritional factors [3], playing a crucial role in traditional diets and food culture.

OBJECTIVE
 The present study focused on the characterization of the products obtained from the solid-state fermentation of fava beans with three different fungal strains. Ingredients resulting from the fermentation (Faba-based Tempeh, Faba-based Koji & Faba-based Oncom) were evaluated techno-functionally and nutritionally.

The objective is to boost the nutritional contribution of traditional foods and also to benefit the local production of these products. In this way, the research of a regionalized consumption of local resources will be both of innovation and using the most of the nutritional contribution.

METHODOLOGY

Softa fava bean (Vicia faba) variety from the Catalan region of Spain was inoculated with different strains of microorganisms for fermentation. Beans were rinsed with water in a 1:3 ratio, adjusted to pH 4.5 and left to soak for 24 hours. The skin was then removed, and beans were cooked in water at pH 4.5. Subsequently, they were dried at 30 °C for one hour and inoculated according to the specifications of the provider (Kamshó, Tarragona, Spain) for each microorganism: *Aspergillus oryzae* (Koji), *Rhizopus oligosporus* (Tempeh) and *Neurospora sitophila* (Oncom), incubating them at 20 °C, on a controlled incubator, for at least 24 hours until a mycelial layer was observed. Products were divided into two batches: one was frozen for later freeze-drying and the other was dried at 70°C for 24 hours, then grounded and subjected to techno-functional and nutritional analysis. Nutritional analysis of total polyphenol content (TPC) were carried out, as well as analyses to measure antioxidant capacity with two protocols: Ferric ion reducing antioxidant power (FRAP) and scavenging activity assay (ABTS).

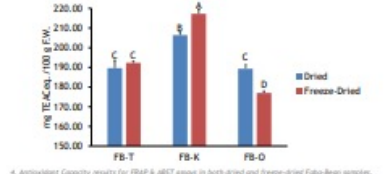
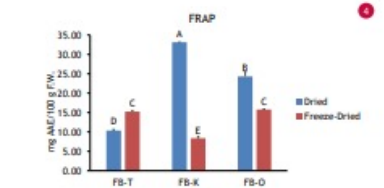
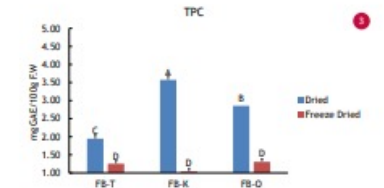
RESULTS

As expected, the mycelial growth of the different fungi used, even under similar incubation conditions, was very different, as can be seen in Figure 1). Faba-based Tempeh (FB-T) showed greater dispersion and uniform coverage on the beans with a bright white color. While the Faba-based Oncom (FB-O), although with less dispersion, presented a characteristic orange-red color. Regarding techno-functional tests, Faba-based Koji (FB-K) presented better results for emulsifying capacity and water retention, while FB-T showed better results for oil retention (2). In nutritional terms, FB-K showed better results in terms of total phenolic content (3.50mg/g) (3) and antioxidant capacity in both FRAP and ABTS assays with almost 35 mg/100g and above 200 mg/100g for ABTS. In the ABTS analysis, the freeze-dried batch showed higher levels in antioxidant capacity in FB-K with almost 220 µM/100g (4). Protein levels were similar in all samples with different strains ranging from 32-35% (5).



2. Most Relevant techno-functional results in both dried and freeze-dried fermented products.

Sample	Oil Retention (%)	Water Retention (%)	Emulsifying Capacity (%)
Freeze-dried FB-T	87.13	297.56	20.80
Freeze-dried FB-K	75.86	247.39	22.21
FB-T	89.31	256.20	31.70
FB-K	67.87	263.13	33.79



5. Protein content percentages for both dried and freeze-dried (FD) samples.

Sample	Protein (%)
Fava-bean (Raw Fermented)	37.25
FB-T	35.87
FB-K	35.68
FB-O	33.58
FD FB-T	35.46
FD FB-K	34.58
FD FB-O	32.85

CONCLUSIONS
 The results obtained seem promising, not only for the nutritional capacity of the beans, but also for the added contribution of the fungal strains used, the advantage in antioxidant capacity and the contribution in phenolic compounds is remarkable. Although there is no significant difference in the protein content, beans continue to be a source of high-quality protein. In subsequent trials, the capacity of absorption of these nutrients by humans will be analyzed.

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Valorization of stone fruit by assessing the acceptability and suitability for minimally-processing

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INTRODUCTION

The stone fruit sector is highly affected by overproduction and stable consumption, generating a large amount of waste. Along with the development of new varieties, valorization through processing into products that maintain their nutritional properties and are more attractive to the consumer is an opportunity for the agri-food sector, leading to the reduction of waste and favoring responsible consumption.



Fig.1. Sustainable Development Goals (SDGs)

Therefore, this work "valorization of peaches and nectarines by assessing their acceptability and suitability for minimal processing" is aligned with 12 (Responsible consumption and production) of "the Sustainable Development Goals (SDGs)".

OBJECTIVE

To valorize stone fruit through the evaluation of the suitability of ten nectarine and peach varieties for minimally-processing (fresh-out)

MATERIAL AND METHODS



Fig.2. Varieties of peach and nectarine

Nectarines and peaches (Fig. 2) were harvested and stored at 0.5°C in fresh-out processing (Fig. 3), the fruit was disinfected, peeled, cut, treated (with or without commercial treatment (NEC, Agricoat Naturseal, UK)), packed in polypropylene trays, sealed with a semi-permeable film and stored at 5°C for 10 days.

Physicochemical quality (firmness, soluble solids (SS), pH, titratable acidity (TA) and ripening index), sensorial acceptation and nutritional quality (polyphenol content (TPC) and antioxidant capacity (FRAP)) of the fresh-out products was analysed after 1, 3, 6, 8 and 10 days of cold storage.



Fig.3. Fresh-out nectarine and peach processing

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RESULTS AND DISCUSSION

1. Varieties suitability for processing

- Peach varieties (Sweet Dream, Baby Gold and Escala), despite being more sensorially acceptable, presented a shorter shelf-life than the nectarine varieties (Table 1).
- The antioxidant capacity (FRAP) and the total polyphenol content (TPC) of the "Diablotina" variety (red flesh) were significantly higher (between 2 and 10 times) than the other varieties (highlighted in pink).
- The nectarine varieties "BigTop" and "Luciana" could be considered suitable because of their extended shelf-life (8 days) and acceptability score (highlighted in green).

Table 1. Physico-chemical properties, shelf-life, acceptability scores and nutritional composition of the fresh-out products obtained from the nectarines and peach varieties studied for processing.

Variety	Firmness (N)	SS (°Brix)	pH	TA (meq/100g fresh wt)	Ripening Index	Shelf life (days)	Acceptability to score (Day 1)	TPC (mg GAE/100g fresh weight)	AOX (FRAP) (mg AA/100g fresh weight)
BIGTOP	8.0	11.8	4.19	3.95	2.81	8	5.7	9.46	67.34
ROYAL SUMMER	5.3	10.0	2.88	4.36	3.48	6	6.1	9.98	43.12
BABY GOLD	2.6	10.9	4.59	3.83	2.37	3	7.0	18.96	110.00
DIABLOTTINA	5.1	15.0	12.76	-	1.17	6	6.1	460.79	460.56
ESCALA	5.3	10.1	6.41	3.70	1.58	6	6.6	18.33	125.96
NECTALINA	3.6	18.3	2.34	4.46	7.80	1	-	20.97	136.81
NECTARINO	3.2	16.2	2.81	4.4	5.76	6	6.2	27.41	200.77
LUCIANA	2.9	12.5	3.52	4.11	4.01	8	6.2	9.28	60.84
SWEET DREAM	2.3	11.5	2.87	4.32	4.31	6	6.0	13.64	126.42
NECTAGALA	6.3	10.3	3.81	4.96	2.71	6	4.4	14.32	153.08

2. Fresh-out optimization

The application of an antioxidant coating (NEC) in the fresh-out product improved visual appearance (Fig.4.A), acceptability scores (Fig.5.A) and nutritional properties (Fig.6) in "Big Top" nectarine. However, the treatment with NEC led to a glazy appearance and artificial sweet flavors in "Luciana" (Fig.4.8) nectarine.

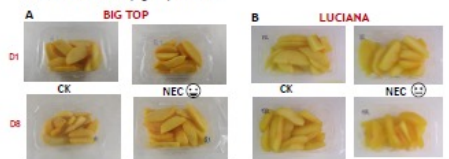


Fig. 4. Appearance of fresh-out "Big Top" (A) and "Luciana" (B) after processing (D1) and after 8 days of storage at 5°C (D8) with (NEC) and without (CK) "NEC" treatment.

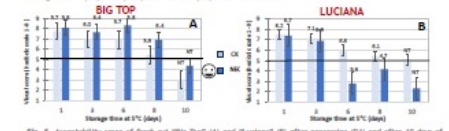


Fig. 5. Acceptability score of fresh-out "Big Top" (A) and "Luciana" (B) after processing (D1) and after 10 days of storage at 5°C (D10) with and without NEC treatment. Bars refer to the visual acceptability of the fresh-out product and the upper numbers are the score obtained in the organoleptic evaluation (N7-test) tested.

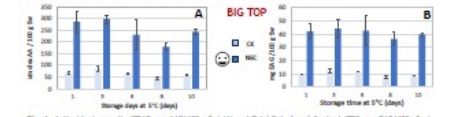


Fig. 6. Antioxidant capacity (FRAP - mg AA/100 g fresh wt) (A) and Total Polyphenol Content (TPC - mg GAE/100 g fresh wt) (B) of fresh-out "Big Top" after processing (D1) and after 10 days of storage at 5°C (D10) with (NEC) and without (CK) "NEC" treatment.

CONCLUSIONS

- Nectarine varieties were more suitable for processing than peach varieties. "Big Top" and "Luciana" were the varieties that presented the highest visual quality during its 8-day shelf life.
- The treatment with the antioxidant "NEC" improved the visual, sensory and nutritional quality of the fresh-out product. However, a glazy appearance and artificial sweet flavors could appear in the fruit after the treatment with the antioxidant (NEC).



Thanks for your attention

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Postharvest, Processed Fruits and Vegetables.



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