The PRIMA programme is an Art. 185 initiative supported and funded under Horizon 2020, the European Union's Framework Programme for Research and Innovation'

Deliverable title	D1.5 General Project meeting n.3 Report
Deliverable Lead:	UNIVPM
Related Work Package:	WP1 - Project coordination and overall management
Related Task:	T1.1 Organization of general Project meetings
Author(s)	Lucia Aquilanti
Dissemination level	PU
Due Submission Date:	30.12.2023 (MONTH 19)
Actual submission:	30.11.2023
Start date of project	**30.05.2022**
Duration	36 months
Summary of Deliverable D1.5 – General Meeting n.3 Report	The third general meeting of SEAFENNEL4MED, held on November 22nd, 2023 at CREA-AN in Rome. For the first time since the kick-off, partners were able to gather in person and present concrete results from across all work packages, demonstrating how the project is steadily turning ideas into tangible outputs. The meeting showcased impressive progress. Under WP3, partners from Italy, Croatia, Tunisia, and Türkiye presented their work on sampling and characterizing wild sea fennel populations. Seeds have been collected, catalogued, and stored in seed banks, while detailed morphological, chemical, and genetic analyses are underway to identify the most promising ecotypes. Early findings already highlight the remarkable biodiversity of sea fennel across the Mediterranean. In WP4, cultivation trials have advanced, with seedlings transplanted into demo fields in Croatia, Tunisia, and Türkiye. Despite challenges such as drought and high summer temperatures, valuable insights have been gathered on growth conditions, bio-fertilizers, and sustainable farming techniques. Italy is preparing to join with its own trials in 2024. WP5 presented a wide array of innovative food prototypes: kimchi-like preserves, pickled fennel, dried spices, oils flavored with fennel, harissa enriched with fennel powder, orange jam, and even handmade pasta and snacks in Türkiye. These exciting experiments demonstrate the versatility of sea fennel as both a traditional and innovative ingredient. WP6 partners reported on extracts and essential oils obtained from by-products, showing promising antioxidant and antimicrobial properties, with potential applications in foods and nutraceuticals. Meanwhile, WP7 and WP8 began to map out the socio-economic and

	environmental impacts of these innovations, ensuring that sustainability and consumer acceptance remain at the core. The meeting also stressed the importance of communication: the project has already delivered newsletters, press articles, conference presentations, and a growing online presence, successfully raising awareness at both scientific and public levels. Plans were set for upcoming meetings in Izmir, France, and Croatia, showing the consortium's commitment to long-term collaboration.

Versioning and Contribution History

Version	Date	Modified by	Modification reason
v1.0	26/11/2023	Lucia Aquilanti	First version
V2.0	30/11/2023	Lucia Aquilanti	Comments after peer review process

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1 Minutes of the project general meeting n. 3

PRIMA FUNDED PROJECT UNDER THE 2021 CALL
"Innovative sustainable organic sea fennel (*Crithmum maritimum* L.) -based cropping systems to boost agrobiodiversity, profitability, circularity, and resilience to climate changes in Mediterranean small farms"
Acronym SEAFENNEL4MED
22nd NOVEMBER 2023

1.1 LOCATION

On **22ND NOVEMBER 2023** at 10:00 am (Rome time) the Principal Investigators (PI) and the research Team Members of the Partners of the SEAFENNEL4MED Consortium met at CREA - Centro di Ricerca Alimenti e Nutrizione (CREA-AN) (address: via Ardeatina, 546, 00178 Rome, Italy) for the project general meeting n.3, regularly convened by the Coordinator of the Project, Prof. Lucia Aquilanti, with an email dated 25.10.2023.

1.2 PARTICIPANTS

The attendance of researchers from the Consortium Partners is shown in the following tables.

P1- Università Politecnica delle Marche
short name: UNIVPM

	NAME AND SURNAME	EMAIL ADDRESS	ROLE	WP	PRESENCE
1	LUCIA AQUILANTI	l.aquilanti@univpm.it	**Coordinator – WP1 Leader** Food microbiologist	All	P
2	DEBORAH PACETTI	d.pacetti@univpm.it	**Vice-Coordinator – WP2 Leader** Food technologist	All	P
3	ANCUTA NARTEA	a.nartea@univpm.it	**Project manager** Post Doc Researcher	1, 2, 6	P
4	DANIELE DUCA	d.duca@univpm.it	**WP8 Leader** Agricultural Engineer	1, 2, 8	P
5	ESTER FOPPA-PEDRETTI	e.foppa@univpm.it	Team member - Agricultural Engineer	1, 2, 8	A
6	SIMONA CASAVECCHIA	s.casavecchia@univpm.it	Team member - Botanist	1, 2, 3	P
7	STEFANO ZENOBI	s.zenobi@univpm.it	Team member - Agronomist	1, 2, 4	P
8	ROBERTO ORSINI	r.orsini@univpm.it	Team member - Agronomist	1, 2, 4	A
9	BIAGIO DI TELLA	b.ditella@staff.univpm.it	Team member - Post Doc Researcher	1, 2, 4	P
10	SIMONA NASPETTI	s.naspetti@univpm.it	Team member - Agrifood economist	1, 2, 7	P
11	RAFFAELE ZANOLI	r.zanoli@univpm.it	Team member -Agrifood economist	1, 2, 7	P
12	VESNA MILANIVIC	v.milanovic@univpm.it	Team member – Soil microbiologist	1, 2, 4	A
13	ANDREA MARCELLI	a.marcelli@univpm.it	Team member – Research fellow	1, 2, 4	P
14	ANTONIETTA MAOLONI	a.maoloni@univpm.it	Team member – Post Doc Researcher	1, 2, 5	P
15	MARYEM KROUIA	maryemkr4@gmail.com	Team member – PhD Student	1, 2, 5	P
16	KOFI ARMAH BOAKYE-YIADOM	k.boakye-yiadom@pm.univpm.it	Team member – PhD student	1,2,8	P

P2- Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria
short name: CREA-AN

	NAME AND SURNAME	EMAIL ADDRESS	ROLE	WP	PRESENCE
1	Antonio Raffo	antonio.raffo@crea.gov.it	**Principal Investigator**– Food chemist	1, 2, 3, 4, 5, 6	P
2	Fiorella Sinesio	fiorella.sinesio@crea.gov.it	Team member – Senior researcher in sensory and consumer science	4,5,6	P
3	Elisabetta Moneta	elisabetta.moneta@crea.gov.it	Team member - Technical Collaborator for Research	4,5,6	P
4	Marina Peparaio	marina.peparaio@crea.gov.it	Team member - Technical Collaborator for Research	4,5,6	P
5	Eleonora Saggia Civitelli	eleonora.saggiacivitelli@crea.gov.it	Team member - Technical Collaborator for Research	4,5,6	P
6	Irene Baiamonte	irene.baiamonte@crea.gov.it	Team member - Researcher	3,4,5,6	P

7	Nicoletta Nardo	nicoletta.nardo@crea.gov.it	Team member - Technical Collaborator for Research	3,4,5	P
8	Valentina Melini	valentina.melini@crea.gov.it	**WP5 Leader** - Researcher	1,2,3,4,5,6	P

P3- RINCI

short name: RINCI

	NAME AND SURNAME	EMAIL ADDRESS	ROLE	WP	PRESENCE
1	LUCA GALEAZZI	l.galeazzi@rinci.it	**Principal Investigator**– Food technologist	1, 2, 4, 5, 6, 7, 8	A
2	CLAUDIA GONNELLI	c.gonnelli@rinci.it	Team member – expert in sales and marketing	1, 2	A
3	ETTORE DRENAGGI	etdrenaggi@gmail.com	External consultant – Agronomist	3	A

P4- University of SPLIT
short name: UNIST

	NAME AND SURNAME	EMAIL ADDRESS	ROLE	WP	PRESENCE
1	IVANA GENERALIĆ MEKINIĆ	gene@ktf-split.hr	**Principal Investigator -** Food Technologist	1, 2, 3, 5, 6	P
2	OLIVERA POLITEO	olivera@ktf-split.hr	Team member – Biochemist	1, 2, 3, 5, 6	P
3	VIDA ŠIMAT	vida@unist.hr	Team member – Food Technologist	1, 2, 3, 5, 6	A
4	DANIJELA SKROZA	danci@ktf-split.hr	Team member - Food Technologist	1, 2, 3, 5, 6	P
5	IVICA LJUBENKOV	ivica.ljubenkov4@gmail.com	Team member – Analytical chemist	1, 2, 3, 5, 6	A
6	LINDA BAZINA	linda.bazina@pmfst.hr	Team member – PhD Student	1, 2, 3, 5, 6	A
7	SANJA RADMAN	sanja.radman@ktf-split.hr	Team member - Biotechnologist	1, 2, 3, 5, 6	A

P5- INSTITUTE FOR ADRIATIC CROPS AND KARST RECLAMATION
short name: **IACKR**

	NAME AND SURNAME	EMAIL ADDRESS	ROLE	WP	PRESENCE
1	Branimir Urlić	branimir.urlic@krs.hr	**Principal Investigator - WP4 Leader** Agronomist	1, 2, 3, 4, 6, 7	P
2	Maja Versic	maja.versic.bratincevic@krs.hr	Team member – Analytical chemist	3, 4, 6	P
3	Marijana Popovic	marijana.popovic@krs.hr	Team member – Analytical chemist	3, 4, 6	P

4	Tonka Nincevic	tonka.nincevic@krs.hr	Team member – Agronomist	3, 4, 6, 7	A
5	Gvozden Dumicic	gvozden.dumicic@krs.hr	Team member – Agronomist	3, 4	A
6	Marko Runjic	marko.runjic@krs.hr	Team member – Post Doc Researcher	3, 4, 7	A

P6- UNIVERSITÉ DE BRETAGNE OCCIDENTALE
short name: **UNIBRE**

	NAME AND SURNAME	EMAIL ADDRESS	ROLE	WP	PRESENCE
1	Christian Magné	christian.magne@univ-brest.fr	**Principal Investigator – WP6 Leader** Plant Physiologist and Biochemist	1, 2, 3, 4, 6, 7	P
2	Xavier Dauvergne	xavier.dauvergne@univ-brest.fr	Team member – Plant ecophysiologist, natural substances	3, 6	A
3	Killian Auzende	killian.auzende@univ-brest.fr	Team member – Design Engineer	3, 6	A
4	Monique Arzur	monique.arzur@univ-brest.fr	Team member - Technician	3, 6	A
5	Manon Inizan	manon.inizan@univ-brest.fr	Team member - Technician	3, 6	A
6	Valerie Roussel	valerie.roussel@univ-brest.fr	Team member - botanist	3, 6	A

P7- INSTITUT NATIONAL DE RECHERCHE EN GÉNIE RURAL, EAUX ET FORĚTS
short name: **INGREF**

	NAME AND SURNAME	EMAIL ADDRESS	ROLE	WP	PRESENCE
1	Abdelhamid Khaldi	khalditn@yahoo.fr	**Principal Investigator** - Senior Researcher in Forestry	1, 2, 3, 4, 5, 6, 7	A
2	Faten Mezni	faten-mez@hotmail.com	Team member - Post Doc researcher - Valorization of forest resources	1, 2, 3, 4, 5, 6, 7	A
3	Ammar Hadj	ammar_hadj@yahoo.fr	Team member - Technician	2,3,4,5,6,7,8	A
4	Awatef Slama	slamaawatef@yahoo.fr	Team member - Post Doc Researcher	2,3,4,5,6,7,8	A
5	Kaouther Ben Yahia	adam.kaouther@yahoo.fr	Team member - Associate professor in Forest Ecology	2,3,6,7,8	A
6	Lilia Naui	lilyabouden@gmail.com	Team member – Agri-food engineer	1, 2, 3, 4, 5, 6, 7	A
7	Boutheina Stiti	stitibou@gmail.com	Team member – Researcher in Forest Ecology	2,4,5,6,8	A
8	Mohamed Tahar El Ayeb	med.elaieb@gmail.com	Team member – Associate professor in Forest Ecology	2,6,8	A
9	Sondes Fkiri	sondesfkiri@gmail.com	Team member – Associate professor in Forest resources	4,5,6,8	A
10	Ezzedine Saadaoui	saad_ezz@yahoo.fr	Team member – Associate professor in Forest resources	2,3,4,6,7,8	A
11	Ali El Khorchani	ali_el_khorchani@yahoo.fr	Team member – Assistant professor in Forest Ecology	2,3,4,5,6,7,8	A

12	Issam Touhami	issam_touhami@yahoo.fr	Team member – Researcher -Forest Ecology	3,4,8	A
13	Samir Dhahri	dhahrisamir72@gmail.com	Team member – Assistant professor in Forest entomology	2,3,4,5,6,7,8	A

P8- EGE UNIVERSITY
short name: **UNIEGE**

	NAME AND SURNAME	EMAIL ADDRESS	ROLE	WP	PRESENCE
1	ÖZLEM KARAHAN UYSAL	Uysal4@gmail.com	**Principal Investigator -** Economist	1, 2, 3, 4, 5, 6, 7	P
2	SEBNEM TAVMAN	sebnemtavman@gmail.com	Team member – Food Engineer	1, 2, 5, 6	A
3	SERDAR GÖKHAN ŞENOL	sgsenol@yahoo.com	Team member – Ecologist Botanist Phytochemist	1, 2, 3	P
4	ÖZGÜR TATAR	tatar.ozgur@gmail.com	Team member – Chemical Engineer	1, 2, 3, 4	P
5	ZERRIN KENANOĞLU	zerrinbektas@hotmail.com	Team member – Agricultural Economist	1, 2, 7	A
6	DUYGU TOSUN	duygutosun@gmail.com	Team member – Agricultural Economist	1, 2, 7	A
7	CIGDEM SONMEZ	cigdemsnmz@gmail.com	Team member – Agronomist	1, 2, 3, 4	A
8	SEHER KUMCUOGLU	seherkumcuoglu@gmail.com	Team member – Food Engineer	1, 2, 5, 6	P
9	OGUZ BAYRAKTAR	oguzbayraktar70@gmail.com	Team member – Agronomist	1, 2, 5, 6	A

Legend: P Present, **A** Absent

1.3 AGENDA FOR THE MEETING

10 h 00 - 10 h 15

Welcome and **opening of the meeting** with communications from the Project Coordinator

10 h 15 - 10 h 30

WP1 slot

- Presentation of the on-going activities and achievements related to project management and coordination (with the up-to-dated list of drafted/delivered deliverables) by **WP1 Leader, Prof. Lucia Aquilanti**

10 h 30 – 10 h 45

WP2 slot

- Presentation of the on-going activities and achievements related to communication and technology transfer (with the up-to-dated list of drafted/delivered deliverables) **by WP2 Leader, Prof. Deborah Pacetti**

10 h 45 – 11 h 45

WP3 slot

- Summary of drafted/delivered deliverables related to characterization of Mediterranean Sea fennel ecotypes by **WP3 Leader, Prof Abdelhamid Khaldi**
- Presentation of the on-going activities and main results achieved by INGREF **Speaker: Dr Ammar El Hadj**
- Presentation of the on-going activities and main results achieved by UNIVPM **Speakers: Prof Simona Casavecchia and Dr Ancuta Nartea**
- Presentation of the on-going activities and main results achieved by CREA-AN **Speaker: Dr Valentina Melini**
-
- Presentation of the on-going activities and main results achieved by UNIST and IACKR **Speaker: Prof. Ivana Generalic Mekenic**
- Presentation of the on-going activities and main results achieved by UNIBRE **Speaker: Prof. Christian Magné**
- Presentation of the on-going activities and main results achieved by UNIEGE **Speaker: Prof. Serdar Gökhan Şenol**
- Open discussion about WP3 issues

11 h 45 – 12 h 45

WP4 slot

- Summary of drafted/delivered deliverables related to sustainable cultivation of sea fennel crop by WP4 Leader, Dr **Branimir Urlic**
- Presentation of the on-going activities and main results achieved by IACKR **Speaker: Dr Branimir Urlic**
- Presentation of the on-going activities and main results achieved by UNIVPM **Speakers: Dr Stefano Zenobi and Dr Andrea Marcelli**
- Presentation of the on-going activities and main results achieved by INGREF **Speaker Dr Ammar El Hadj**
- Presentation of the on-going activities and main results achieved by UNIEGE **Speaker Prof, Özgür Tatar**
- Open discussion about WP4 issues

13 h 00 – 15 h 00

Lunch break at the Locanda …….

15 h 00 – 15 h 00

WP5 slot

- Summary of drafted/delivered deliverables related to exploitation of sea fennel for manufacturing of innovative sea fennel-based foods by **WP5 Leader**, Dr **Valentina Melini, CREA AN**
- Presentation of the on-going activities and main results achieved by UNIVPM and RINCI **Speaker Dr Maryem Krouia and Dr Ancuta Nartea**
- Presentation of the on-going activities and main results achieved by UNIST **Speaker: Prof. Ivana Generalic Mekinic**
- Presentation of the on-going activities and main results achieved by INGREF **Speaker: Dr Ammar El Hadj**
- Presentation of the on-going activities and main results achieved by UNIEGE – **Speaker: Prof. Seher Kumcuoğlu**
- Open discussion about WP5 issues

13 h 00 – 16 h 00

WP6 slot

- Summary of drafted/delivered deliverables related to valorisation of sea fennel crop by-products for production of functional food ingredients/nutraceuticals/soil amendments by **WP6 Leader**, Prof **Christian Magne, UNIBRE**
- Presentation of the on-going activities and main results achieved by UNIBRE **Speaker: Prof Christian Magne, UNIBRE**
- Presentation of the on-going activities and main results achieved by UNIVPM **Speaker: Dr Antonietta Maoloni and Dr Ancuta Nartea**
- Presentation of the on-going activities and main results achieved by CREA AN **Speaker: Dr Antonio Raffo**
- Presentation of the on-going activities and main results achieved by UNIST **Speaker: Prof. Ivana Generalic Mekinic**
- Presentation of the on-going activities and main results achieved by INGREF **Speaker: Dr Ammar El Hadj**
- Open discussion about WP6 issues

14 h 00 – 17 h 00

WP7 slot

- Summary of drafted/delivered deliverables related to demonstration of socio-economic benefits of the proposed innovations by **WP7 Leader**, **Prof Ozlem Karahan Uysal**
- Presentation of the on-going activities and main results achieved by UNIEGE **Speaker: Prof. Prof Ozlem Karahan Uysal**
- Presentation of the on-going activities and main results achieved by UNIVPM **Speaker: Prof Raffaele Zanoli**
- Open discussion about WP7 issues

15 h 00 – 17 h 30

WP8 slot

- Summary of drafted/delivered deliverables related to demonstration of environmental benefits of the proposed innovations by **WP8 Leader**, Prof **Daniele Duca, UNIVPM**
- Presentation of the on-going activities and main results achieved by UNIVPM **Speaker: Dr Kofi Armah Boakye-Yiadom**
- Open discussion about WP8 issues

17 h 30

Expected closure of the meeting

1.4 MEETING MINUTES AND CONCLUSIONS

- **Welcome and opening of the meeting, communications from the Coordinator**

The Project Coordinator opens the meeting at 10.15 a.m (Rome time) and welcomes the participants.
The Coordinator kindly reminds to PIs to regularly check in the shared folders up-loaded in SHAREPOINT at https://univpm.sharepoint.com/sites/SEAFENNEL4MED-sharedplatform for the drafting of deliverables and sharing of procedures/protocols.
The Coordinator shares with Consortium Partners the following information:

- ✓ On 21st November 2023 a meeting in Sitges (Spain) was held; it was organized by PRIMA for networking among PRIMA project coordinators; due to the overlapping of dates, the Coordinator could not attend the meeting, but sent a poster describing the main objectives and strategies, the Consortium, the budget, etc.

- ✓ Tentatively in December 2023/January 2024, the Project coordinator and the Vice-Coordinator will be interviewed by an external expert and the Prima project officer, for the MIDTERM AUDIT (18 months since the start of the project). Such an interview will allow the Coordinator to illustrate the multiple activities carried out

during the reporting period. In view of this event, **the Coordinator strongly recommends that WP leaders finalize that drafting of deliverables whose delivery date falls within the first project half.**

- ✓ The Coordinator remind to PIs, WP Leaders, and team members to use the SEAFENNEL4MED WhatsApp group for the sharing of pictures and videos; this also represents a tool for fast communication among PIs and WP leaders. Pictures are of crucial importance for the drafting of Newsletters, reports, and leaflets.

- ✓ The social media manager reminds how to manage collaborative posts of PIs, WP Leaders and team members and how to invite the page SEAFENNEL4MED_PRIMA as a collaborator to a post PIs, WP Leaders and team members are creating: before publishing the post, tap Tag people; tap Invite collaborator; search for the account SEAFENNEL4MED_PRIMA to add as a collaborator, then tap the account; tap Done. The social media are available at the following links:

  https://www.instagram.com/seafennel4med_prima/
  https://www.facebook.com/people/SeaFennel4Med_Prima/100094057515351/

- ✓ The Coordinator reminds the need that WP leaders convey regularly specific meetings within their own WP to monitor the progresses of the activities and, most of all, the drafting of deliverables, where methods and main results from all the partners involved should be added.

- ✓ The Coordinator reminds that all shared protocols/procedures (included the new procedure for the genetic characterization of wild sea fennel populations) can be downloaded from https://drive.google.com/drive/folders/1zz194wTVswDVWx_5hF9mk-TJ01hxYBJx whereas the editable *.doc files of deliverables are available at https://univpm.sharepoint.com/sites/SEAFENNEL4MED-sharedplatform.

• WP1

As Leader of WP1, Prof. Lucia Aquilanti shows a brief presentation illustrating the activities to date carried out within WP1, as well as the list of deliverables (either in progress or delivered) for this WP. Both are shown as follows:

Tasks:

Task 1.1. Organization of general Project meetings **ON-GOING**
Task 1.2. Project coordination, management, supervision, and quality control **ON-GOING**
Task 1.3. Communication with PRIMA call secretariat and the funding Agencies **ON-GOING**
Task 1.4 Preparation of mid-term and final reports **ON-GOING**
Deliverables:

D1.1 General Project meeting n.1 (Kick off meeting) Report (month 2) **DELIVERED IN DUE TIME ON 17TH JUNE 2022**
D1.2 Quality Assurance Plan (month 3). **DELIVERED IN DUE TIME ON 16TH JUNE 2022**
D1.3 General Project meeting n.2 Report (month 13); **DELIVERED IN DUE TIME ON 16TH JUNE 2022**
D1.4 1st year (progress) Report (month 13); **DELIVERED IN DUE TIME ON 30TH JUNE 2023**
D1.5 General Project meeting n.3 Report (month 19); **TO BE DELIVERED BY 30TH DECEMBER 2023**
D1.6 General Project meeting n.4 Report (month 25); **TO BE DELIVERED BY 30TH JUNE 2024**
D1.7 2nd year (progress) Report (month 25); **TO BE DELIVERED BY 30TH JUNE 2024**
D1.8 General Project meeting n.5 Report (month 31);
D1.9 General Project meeting n.6 (Final workshop) (month 36);
D1.10 3rd year (final) Report (month 36)

Briefly, two deliverables (being D1.3 and D1.4) have been delivered in the reporting period (month 12 - 18); three further deliverables (D1.5, D1.6 and D1.7) will be delivered in a few weeks.

Regarding D1.6, the Coordinator kindly asks to PI of the Turkish team to confirm the availability of UNIEGE (Izmir) to host the **4th GENERAL MEETING**, tentatively scheduled for **24TH MAY 2024**. Prof. Ozlem Karahan Uysal and her team confirms the availability of UNIEGE to host the meeting.

Regarding D1.8 and D1.9, the coordinator kindly asks to the Consortium partners to candidate for hosting the next general meetings. Prof. Christian Magnè candidates UNIBRE (France) for hosting the **5th general meeting**, which is tentatively scheduled for **NOVEMBER 2024**, whereas Ivana Generalich (UNIST) and Branimir Urlich (IACKR) candidate Croatia for hosting the **6th general meeting**, which is scheduled tentatively for **APRIL-MAY 2025**.

- ## WP2

The Project Coordinator leaves the floor to Prof. Deborah Pacetti (UNIVPM), leader of the WP2, who briefly presents the on-going activities and deliverables (either in progress or delivered) related to communication and technology transfer. In her presentation (Annex II), Prof Deborah Pacetti shows the status of tasks and deliverables, which is reported as follows.

Tasks:

Task 2.1 Start-up activities **ON-GOING**
Task 2.2 Establishment of a stakeholder-platform and knowledge exchange network **ON-GOING**
Task 2.3 Installation and continuous up-date of SEAFENNEL4MED website **ON-GOING**
Task 2.4 Production of dissemination materials **ON-GOING**
Task 2.5 Documentation of scientific results **ON-GOING**
Task 2.6 Demonstration activities **ON-GOING**

Deliverables:
D2.1 Project logo and communication templates (month 1); **DELIVERED IN DUE TIME ON 30.06.2022**
D2.2 Public SEAFENNEL4MED website (month 2); **DELIVERED IN DUE TIME ON 30.07.2022**
D2.3 SEAFENNEL4MED intranet (month 2); **DELIVERED IN DUE TIME ON 30.06.2022**
D2.4 Press release at Project launch for the wide public (month 3); **DELIVERED IN DUE TIME ON 30.08.2022**
D2.5 Establishment of a stakeholder platform for knowledge exchange network (month 6); **DELIVERED IN DUE TIME ON 30.11.2022**
D2.6 SEAFENNEL4MED Data Management Plan (month 6); **DELIVERED IN DUE TIME ON 30.11.2022**
D2.7 Demonstration activity 1: sea fennel harvesting campaign involving students (month 20) **DELIVERED IN DUE TIME ON 30.10.2023**
D2.8 Demonstration activity 2: presentation of sea fennel-based recipe book (month 34) **TO BE DELIVERED BY 31st MARCH 2025**
D2.9 Collection of 12 newsletters (month 36)
D2.10 At least 2 articles in journals/magazines destined to professionals in the field of crop and/or food production (months 36)
D2.11 At least 4 open access papers published in international peer-reviewed journals (months 36)
D2.12 At least 4 conference proceedings (months 36)
D2.13 At least 1 downloadable Project leaflet (month 36)
D2.14 At least 1 video on new sustainable organic sea fennel cropping systems and applications of the new crops for production of food/food ingredients/nutraceuticals (month 36)
D2.15 Press release at Final Workshop (month 36)

D2.16 Attendance at almost 1 event/exhibition aimed at promoting Mediterranean agri-food products where the supply and demand can encounter each other and the researchers (month 36)

Briefly, one deliverable (D2.7) has been delivered in the reporting period (months 13 - 18).

Regarding **D2.8**, Prof. Deborah Pacetti recommend to PIs to start with the collection of national/local recipes involving sea fennel as an ingredient, possibly with images/pictures and anecdotes regarding local customs/traditions regarding the diffusion/collection/consumption of sea fennel. All the collected materials (recipes+images+notes) will be shared in SHAREPOINT using a dedicated folder and/or the seafennel4med WhatsApp chat (SEAFENNEL4MED Consortium).

Regarding **D2.9**, Prof Deborah Pacetti reminds that, to date, 5 Newsletters have already been sent to the SEAFENNEL4MED Stakeholder platform (one every 3 months, as planned; 1 newsletter in the reporting period).

Regarding **D2.10,** Prof Deborah Pacetti reminds that to date, 10 articles have been published in journals/magazines destined to professionals in the field of crop and/or food production and/or to the open public (see the following lists of articles, grouped by Consortium partner).

UNIVPM

PUBLICATION IN DIVULGATION JOURNAL/MAGAZINE	D2.10	Article published in the Italian National Newspaper "Il Resto del Carlino - 24th July 2022 **Title**: "*Politecnica, studio sui benefici del finocchio marino*" https://www.ilrestodelcarlino.it/ancona/cronaca/politecnica-studio-sui-benefici-del-finocchio-marino-1.7916229	Italian newspaper "Il Resto del Carlino"
PUBLICATION IN DIVULGATION JOURNAL/MAGAZINE	D2.10	Article published in the local on-line magazine "Cronacheancona.it" - 22nd July 2022 **Title**: "*Finocchio marino: UNIVPM coordina studio internazionale sulla coltivazione biologica*" https://www.cronacheancona.it/2022/07/22/finocchio-marino-univpm-coordina-studio-internazionale-sulla-coltivazione-biologica/378538/	Local on-line magazine "Cronacheancona.it"
PUBLICATION IN DIVULGATION JOURNAL/MAGAZINE	D2.10	Article published in the local on-line magazine "Adriaeco" – 22nd July 2022 **Title**: "*Studio internazionale coordinato da Univpm sul finocchio marino*" https://www.adriaeco.eu/2022/07/23/studio-internazionale-coordinato-da-univpm-sul-finocchio-marino/	Local on-line magazine "Adriaeco"
PUBLICATION IN DIVULGATION JOURNAL/MAGAZINE	D2.10	Article published in the local on-line magazine "VivereAncona.it" – 23rd July 2022 **Title**: "*I Paccasassi al centro di uno studio internazinale di agroecologia targato UNIVPM*" https://www.adriaeco.eu/2022/07/23/studio-internazionale-coordinato-da-univpm-sul-finocchio-marino/	Local on-line magazine "VivereAncona.it"
PUBLICATION IN DIVULGATION JOURNAL/MAGAZINE	D2.10	Article published in the local on-line magazine "VivereMarche.it" - 22nd July 2022 **Title**: "*Ancona: I Paccasassi al centro di uno studio internazinale di agroecologia targato UNIVPM*" https://www.viveremarche.it/2022/07/23/ancona-i-paccasassi-al-centro-di-uno-studio-internazinale-di-agroecologia-targato-univpm/2100223019	Local on-line magazine "VivereMarche.it"

PUBLICATION IN DIVULGATION JOURNAL/MAGAZINE	D2.10	Article published in the local on-line magazine "AnconaNews" - 22nd July 2022 **Title**: "*Finocchio marino, Univpm coordina studio internazionale sulla coltivazione biologica*" https://www.anconanews.it/2022/07/22/finocchio-marino-univpm-coordina-studio-internazionale-sulla-coltivazione-biologica/	Local on-line magazine "AnconaNews"
PUBLICATION IN DIVULGATION JOURNAL/MAGAZINE	D2.10	Interview to the project Coordinator, Prof. Lucia Aquilanti (UNIVPM), published in the online magazine "Agrifoglio" – 4th January 2023 **Title**: "*E' ora di conoscere il Paccasasso, ce lo presenta la professoressa Lucia Aquilanti*" https://agrifoglio.ilfoglio.it/lezioni-private/e-ora-di-conoscere-il-paccasasso-ce-lo-presenta-la-professoressa-lucia-aquilanti/	On-line magazine "Agrifoglio"

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PUBLICATION IN DIVULGATION JOURNAL/MAGAZINE	D2.10	Article published in the Slobodna Dalmacija magazine, July 2023 **Title**: Samoniklo blago: Motar je zvijezda priobalne gastronomije, ali i moćno 'oružje' za detoksikaciju: donosimo tri recepta za kiseljenje ove uistinu posebne delicije Authors: Generalić Mekinić I. https://maslina.slobodnadalmacija.hr/maslina/kuzina/motar-je-mocno-oruzje-za-detoksikaciju-donosimo-tri-recepta-za-kiseljenje-1208308	Popular paper in on-line Slobodna Dalmacija, 14 July 2022
PUBLICATION IN DIVULGATION JOURNAL/MAGAZINE	D2.10	Article published in the Maslina magazine, July 2023 **Title**: Projekt SEAFENNEL4MED: Motar je hrana budućnosti Authors: Generalić Mekinić I., Urlić B. https://maslina.slobodnadalmacija.hr/maslina/agrobiznis/motar-je-hrana-buducnosti-1323658	Article in Maslina magazine, July 2023

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PUBLICATION IN DIVULGATION JOURNAL/MAGAZINE	D2.10	Article published in the Maslina magazine, July 2023 **Title**: Projekt SEAFENNEL4MED: Motar je hrana budućnosti Authors: Generalić Mekinić I., Urlić B. https://maslina.slobodnadalmacija.hr/maslina/agrobiznis/motar-je-hrana-buducnosti-1323658	Article in Maslina magazine, July 2023

Regarding **D2.11** Prof Deborah Pacetti shows the lists (reported below) of the open access papers (grouped by Consortium partner) published in international peer-reviewed journals with key data collected throughout the project SEAFENNEL4MED.

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OPEN ACCESS PUBLICATION IN INTERNATIONAL PEER-REVIEWED JOURNALS	D2.11	An original research paper reporting the analysis of alcoholic extracts from sea fennel leaves and flowers for beneficial effects on human health.	**International peer-reviewed Journal**: Food bioscience, Elsevier

		Title: Sea fennel (Crithmum maritimum L) leaves and flowers: bioactive compounds, antioxidant activity and hypoglycaemic potential **Authors**: Ancuta Nartea; Oghenetega Lois Orhotohwo; Benedetta Fanesi; Paolo Lucci, Professor; Monica Rosa Loizzo, Professor; Rosa Tundis, professor; Lucia Aquilanti, Professor; Simona Casavecchia, Professor; Giacomo Quattrini. *Food bioscience,* Elsevier, In press.	
OPEN ACCESS PUBLICATION IN INTERNATIONAL PEER-REVIEWED JOURNALS	D2.11	An original research paper reporting the exploitation of sea fennel for production of dried spices using different drying methods. **Title**: Impact of Different Drying Methods on the Microbiota, Volatilome, Color, and Sensory Traits of Sea Fennel (Crithmum maritimum L.) Leaves **Authors**: Maoloni, A.; Cardinali, F.; Milanović, V.; Reale, A.; Boscaino, F.; Di Renzo, T.; Ferrocino, I.; Rampanti, G.; Garofalo, C.; Osimani, A.; et al. *Molecules* **2023**, 28, 7207. https://doi.org/10.3390/molecules28207207	**International peer-reviewed Journal**: Molecules, MDPI **Special Issue** "Halophytes: Nutrients, Bioactive Compounds, Chemical Characterisation and Potential Applications"

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OPEN-ACCESS PUBLICATION IN INTERNATIONAL PEER-REVIEWED JOURNALS	D2.11	**Title**: Chemical Profiling of Sea Fennel (*Crithmum maritimum* L., Apiaceae) Essential Oils and Their Isolation Residual Waste-Waters **Authors**: Politeo O., Popović M., Veršić Bratinčević M., Kovačević K., Urlić B., Generalić Mekinić I. **Journal**: Plants 2023, 12(1), 214., https://doi.org/10.3390/plants12010214	**International peer-reviewed Journal**: Plants, MDPI
OPEN-ACCESS PUBLICATION IN INTERNATIONAL PEER-REVIEWED JOURNALS	D2.11	**Title**: Conventional vs. Microwave-Assisted Hydrodistillation: Influence on the Chemistry of Sea Fennel Essential Oil and Its By-Products **Authors:** Politeo O., Popović M., Veršić Bratinčević M., Koceić P., Ninčević Runjić T., Generalić Mekinić I. **Journal**: Plants 2023, 12(7), 1466. https://doi.org/10.3390/plants12071466	**International peer-reviewed Journal**: Plants, MDPI
OPEN-ACCESS PUBLICATION IN INTERNATIONAL PEER-REVIEWED JOURNALS	D2.11	**Title**: Comparison of Conventional and Green Extraction Techniques for the Isolation of Phenolic Antioxidants from Sea Fennel. **Authors:** Veršić Bratinčević M., Kovačić R., Popović M., Radman S., Generalić Mekinić I. **Journal**: Processes 2023, 11, 2172. https://doi.org/10.3390/pr11072172	**International peer-reviewed Journal**: Processes, MDPI
OPEN-ACCESS PUBLICATION IN INTERNATIONAL PEER-REVIEWED JOURNALS	D2.11	**Title**: Vinegar-Preserved Sea Fennel: Chemistry, Color, Texture, Aroma, and Taste **Authors:** Radman, S., Brzović, P., Radunić, M., Rako, A., Šarolić, M., Ninčević Runjić, T., Urlić, B., Generalić Mekinić, I. **Journal**: Foods, 12 (2023) 3812, 13. https://doi.org/10.3390/foods12203812	**International peer-reviewed Journal**: Foods, MDPI

Regarding **D2.12** Prof Deborah Pacetti shows the list (reported below) of abstracts for posters and oral presentations referred to the attendance at national/international conferences.

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CONTRIBUTION AT NATIONAL/INTERNATIONAL CONFERENCES	D2.12	A flash presentation focusing on the by-product of a new crop of sea fennel will be presented at the EuroFoodChem Congress, an important international gathering in the field of food chemistry and it will take place June 14 – 16, 2023 in the capitol of Serbia, Belgrade. **Title**: Profiling of carotenoids and tocopherols of a new food ingredient based on sea fennel industrial by-product	**International Conference:** XXII EuroFoodChem, 2023, Belgrade, Serbia **Session** "Food composition, quality and safety"

		Authors: Nartea A., Fanesi B., Lucci P., Casavecchia S., Aquilanti L., Pacetti D. Flash presentation accepted by the Scientific Committee of XXII EuroFoodChem https://xxiieurofoodchem.com/	
CONTRIBUTION AT NATIONAL/INTERNATIONAL CONFERENCES	D2.12	A Poster presentation aimed at describing the preliminary results on the application of a biofertilizer on sea fennel (*Crithmum martimum* L) seeds and crop for improvement of soil quality and crop yield. **Title:** Impact of bio-fertilization on sea fennel (Crithmum maritimum L.) seed germination, plant growth, and soil biodiversity and health. **Authors:** Marcelli A, Milanović V, Zenobi S, Di Tella B., Orsini R, Aquilanti L.	**International Conference:** *7th International Conference on Microbial Diversity "Agrifood microbiota as a tool for a sustainable future* (**MD2023)** **26-29 September 2023, Parma (Italy)** **Session** ENVIRONMENT microbiota as a tool for a sustainable future

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CONTRIBUTION AT NATIONAL/INTERNATIONAL CONFERENCES	D2.12	**Title**: Characterization of the aroma of essential oils from sea fennel (Crithmum maritimum L.) leaves and crop by-products. **Author**: Raffo A., Baiamonte I., Nardo N., Melini V., Nartea A., Pacetti D., Aquilanti L. Oral presentation https://www.wartburg-symposium.de/	**International Conference**: 13th Wartburg Symposium on Flavor Chemistry & Biology, Eisenach, Germany Eisenach, 03-06/10/2023

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CONTRIBUTION AT NATIONAL/INTERNATIONAL CONFERENCES	D2.12	**Title:** Halophytes- Crops of the future **Authors:** Slišković L., Ninčević Runjić T., Dumičić G., Runjić M., Politeo O., Urlić, B., Generalić Mekinić I. A poster presentation on the most widespread halophyte species (among which special attention was paid to Crithmum maritimum) growing along the Adriatic coast, their main characteristics, their potential for use in different sectors and their importance for the environment (professional paper planned).	**4th International ZORH conference of scientists, professionals and students**, 20th-21th of April 2023, Split, Croatia
CONTRIBUTION AT NATIONAL/INTERNATIONAL CONFERENCES	D2.12	**Title:** *Inula crithmoides* and *Crithmum maritimum* – GC-MS analyses of essential oils and hydrolates Authors: Politeo, O., Bakaric, A., Curlin, P., Popović, M. **Poster presentation**	**International Conference:** ISEO 2023, 53rd International Symposium on Essential Oils, Septempebr 13-16, 2023, Milazzo, Messina, Italy
CONTRIBUTION AT NATIONAL/INTERNATIONAL CONFERENCES	D2.12	**Title**: Phenolic antioxidants from Adriatic sea fennel wild-grown populations **Authors**: Skroza, D., Generalić Mekinić, I., Podrug, R., Prga, I., Šantić, I., Veršić Bratinčević, M., Popović, M., Urlić, B., Ninčević Runjić, T., Runjić, M., Dumičić, G., Šimat, V., Brzović, P. **Poster presentation**	**International Conference:** 14th International Scientific and Professional Conference WITH FOOD TO HEALTH, 14 – 15 September 2023, Osijek, Croatia
CONTRIBUTION AT NATIONAL/INTERNATIONAL CONFERENCES	D2.12	**Title**: Influence of harvest location on phenolic composition and antioxidant activity of sea fennel **Authors**: Mimica N., Generalić Mekinić I., Skroza D., Brzović P. **Poster presentation**	**International Conference:** 14th International Scientific and Professional Conference WITH FOOD TO HEALTH, 14 – 15 September 2023, Osijek, Croatia

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CONTRIBUTION AT NATIONAL/INTERNATIONAL SYMPOSIUM	D2.12	**Title:** Morphological Character Comparison of *Crithmum maritimum* L. (Apiaceae) Populations with Different Substrate Characteristics in İzmir Provience **Authors:** Şenol, G.S., Nacar,I.G, Adalı, S. **Oral Presentation:** http://www.ipgrs2023.org/Content_Files/Content/IPGRS%20PROGRAM%20271023.pdf	**International Symposium:** Mirza Gokgol International Plant Genetic Resources Symposium, 6-9 November 2023, İzmir, Turkiye.
CONTRIBUTION AT NATIONAL/INTERNATIONAL SYMPOSIUM	D2.12	**Title:** Evaluation of Hand-Made Pasta Production by Using Sea Fennel (*Crithmum maritimum* L.) Authors: Basturk Berk, B., Bozdogan, N., Kumcuoglu, S., Tavman, S. **Oral presentation:** https://euroaliment.ugal.ro/images/2023/EuroAliment_PROGRAMME_2023.pdf	**International Symposium:** 11th Edition of the International Euro-Aliment Symposium 2023, 19-20 October, Online Event

Finally, regarding D2.16 Prof Deborah Pacetti shows the list of participations at event/exhibition aimed at promoting Mediterranean agri-food products where the supply and demand can encounter each other and the researchers

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ATTENDED EVENT/EXHIBITION	D2.16	Participation at 2022 European Researchers Night by Urlic B., Runjić M., Ninčević Runjić T., Generalic Mekinic – I. - Project promotion (Pictures and flyer in ANNEX)	**2022 European Researchers' Night,** September 30, 2022, Split, Croatia
ATTENDED EVENT/EXHIBITION	D2.16	Participation in "Festival održivosti 2023" (Sustainability Fair) by Generalic Mekinic I., Šimat V. and Skroza D. - Festival of the promotion of different food products- Project promotion, sea fennel products promotion (Pictures in ANNEX)	Festival održivosti, September 13-19th 2023, Kopačevo, Osijek, Croatia
ATTENDED EVENT/EXHIBITION	D2.16	Participation at 2023 European Researchers Night by Urlic B., Runjić M., Ninčević Runjić T., Generalic Mekinic I., Radman S., Popović M., Veršić Bratincević M. - Project promotion, sea fennel products promotion (Pictures, flags and bookmarks in ANNEX)	**2023 European Researchers' Night,** September 29th, 2023, Split, Croatia

- # WP3

The Project Coordinator leaves the floor to Dr Faten Mezni (Delegate of the WP3 Leader Prof. Abdelhamid Khaldi), who briefly presents the on-going activities and deliverables related to characterization of Mediterranean sea fennel ecotypes (with the up-dated list of drafted/delivered deliverables).

In her presentation (Annex III) Dr Faten Mezni shows the status of tasks and deliverables, which is reported as follows.

Tasks:
Task 3.1 (RES). Sampling and morphological characterization of spontaneously growing sea fennel populations **ON-GOING**
Task 3.2 (RES) Chemical analysis of dried sea fennel aerial parts/seeds **ON-GOING**
Task 3.3 (RES). Molecular analysis of sea fennel aerial parts **ON-GOING**
Task 3.4 (RES) Elaboration of morphological, chemical, and genetic data for potential identification of different ecotypes **NOT STARTED**

Deliverables:

D3.1 Dried sea fennel biomass (leaves, stems, flowers) from at least 5 Mediterranean spontaneous sea fennel populations (month 6) **DELIVERED IN DUE TIME ON 30TH NOVEMBER 2022**
D3.2 Catalogued and stored seeds (≥ 2500) from at least 5 Mediterranean sea fennel populations (month 8→ 30.01.2023) **DELIVERED IN DUE TIME ON 30TH JANUARY 2023**
D3.3 Selected Mediterranean sea fennel germplasm (at least 1 ecotype) for cultivation (month 10→ 30.03.2023) **DELIVERED IN DUE TIME ON 30TH MARCH 2023**
D3.4 Report with elaborated data overall collected within WP3 (month 10→ 30.03.2023) **DELAYED**

After the presentation of tasks and deliverables by Dr Faten Mezni, the representatives of Research partners involved in the WP3 show the on-going activities and main results achieved by the different Partners involved into WP3. A summary of these presentations is reported below.

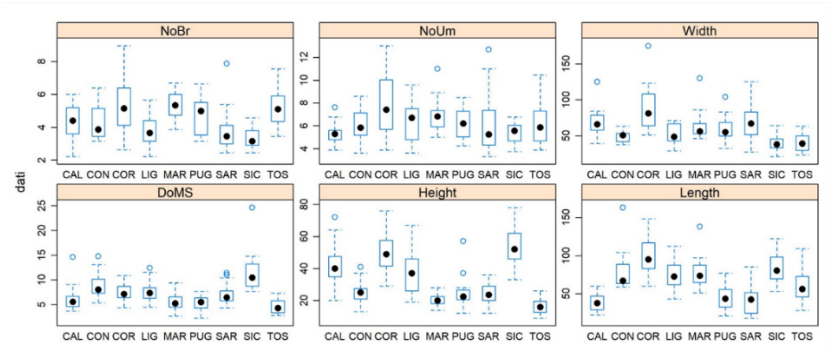
ITALY

Nine populations were sampled across coast areas of Italy and Corsica Island; each population was labelled as follows:

SIC: Northern Sicily (Tyrrhenian Sea)
SAR: Sardinia (Gallura, Tyrrhenian Sea)
CAL: Calabria (Ionian Sea)
PUG: Gargano peninsula (Adriatic Sea)
TOS: Tuscany (Tyrrhenian Sea)
MAR: Marche (Adriatic Sea)
CON: Mount Conero (Adriatic Sea)
LIG: Liguria (Tyrrhenian Sea)
COR: Corsica (Western Mediterranean Sea)

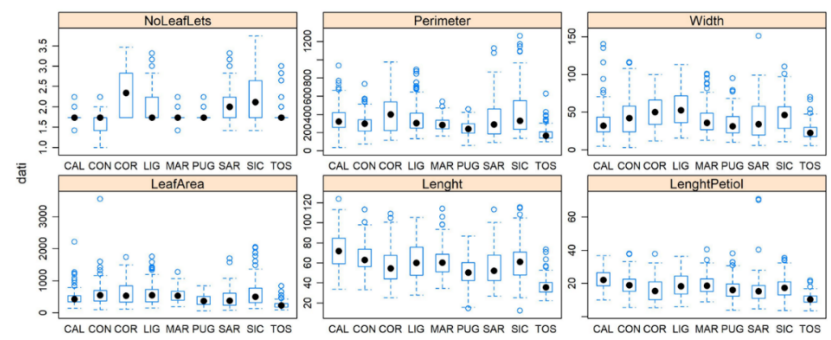
Statistical analysis carried out onto morphometric data showed significant differences between the morphological traits of the five Tunisian populations (seeds, leaves and whole plant). Some graphs showing these differences are reported below.

WHOLE PLANT

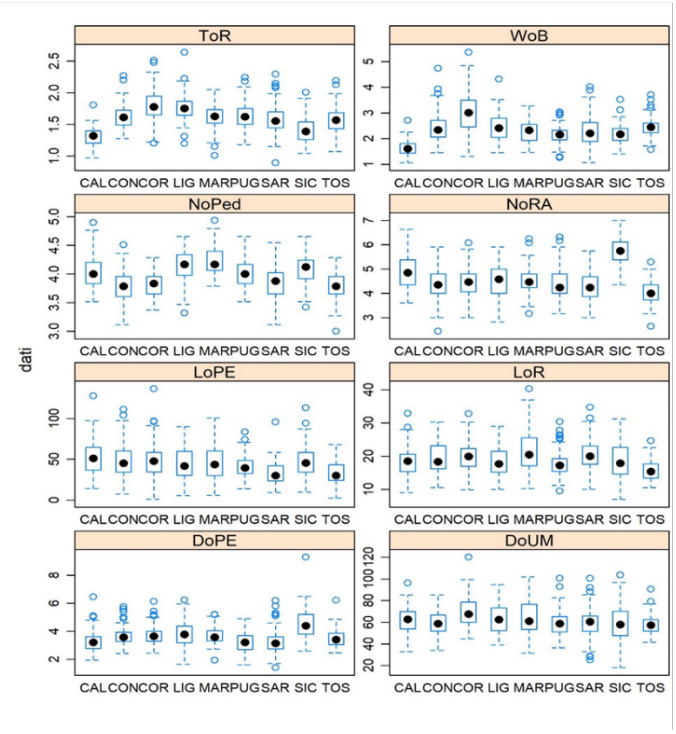


NoUm = Number of umbels
DoMs = Diameter of the main stem
NoBr = number of branches

LEAVES



The PRIMA programme is an Art. 185 initiative supported and funded under Horizon 2020, the European Union's Framework Programme for Research and Innovation'



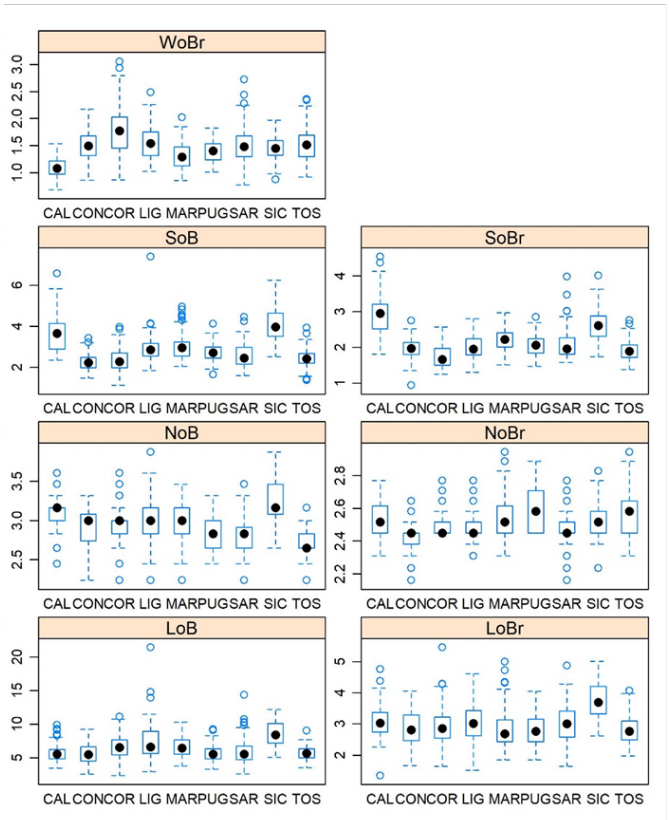
UMBELS

ToR = thickness of ray
WoB = width of bracts

NoPed = Number of pedicels per umbellet
NoRA = Number of rays per umbel

LoPE = Length of peduncle
LoR = Length of rays

DoPE = Diameter of peduncle
DoUM = Diameter of the umbels



UMBELS

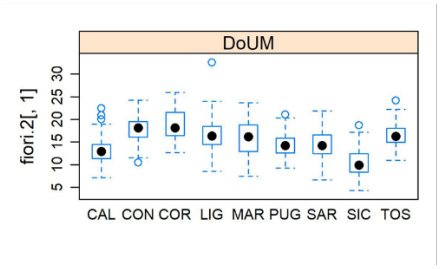
WoBr = width of bracteoles

SoB = Shape of bracts
SoBr = Shape of bracteoles

NoB = Number of bracts
NoBr = Number of bracteoles

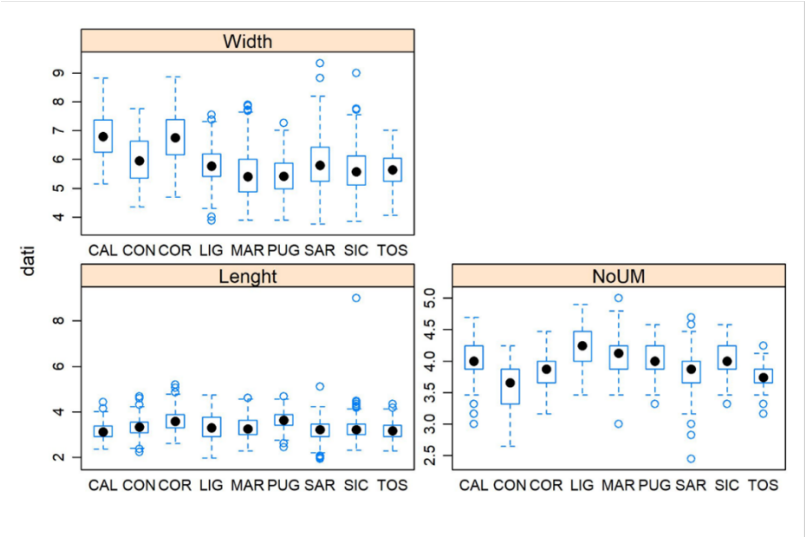
LoB = Length of bracts
LoBr = Length of bracteoles

FLOWERS



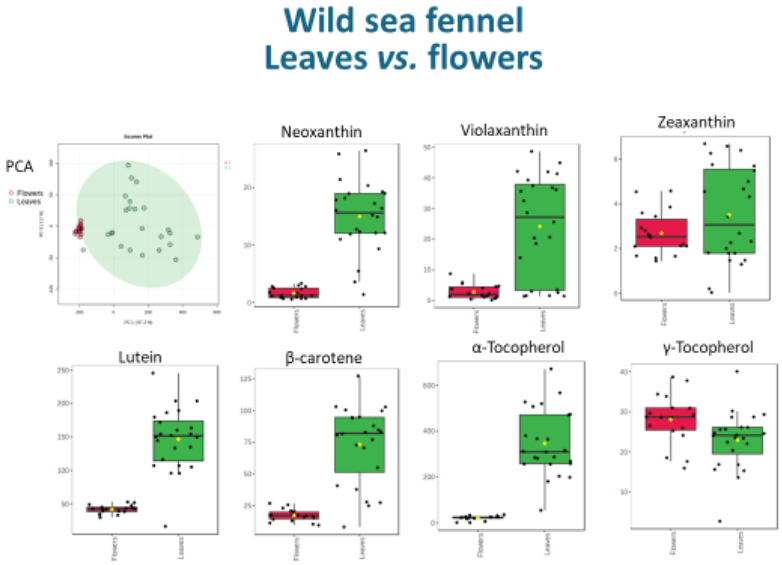
DoUM = Diameter of the umbellet

FRUITS



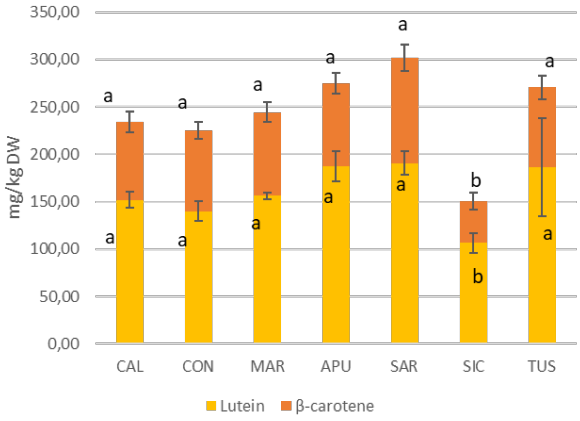
NoUM = Number of fruits per umbellet

Regarding chemical data, again the statistica elaboration of data, made to compare leaves and flowers from the different Italian populations showed significant differences, as summarized in the following figure.

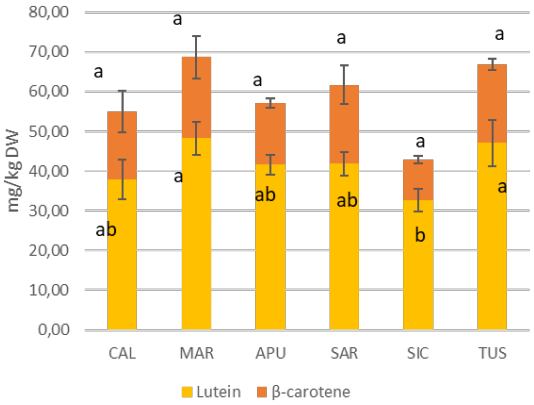


The PRIMA programme is an Art. 185 initiative supported and funded under Horizon 2020, the European Union's Framework Programme for Research and Innovation'

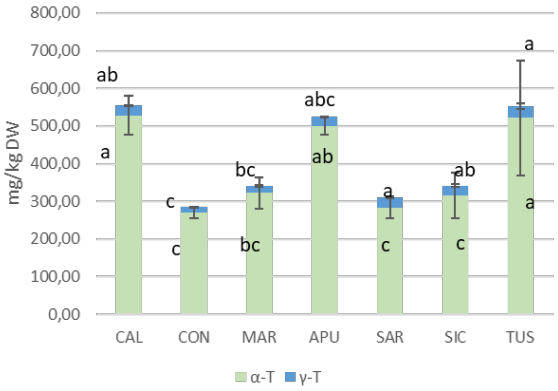
Carotenoids in leaves of *C. maritimum*



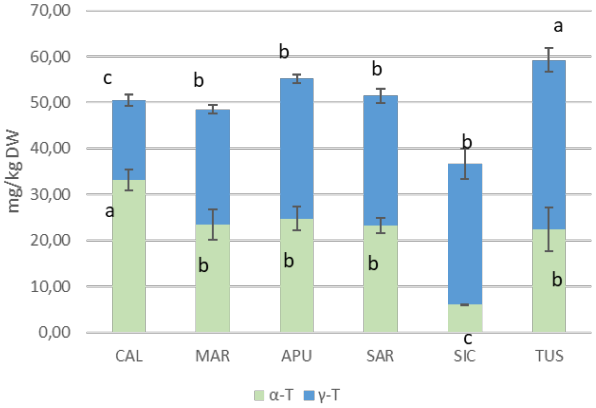
Carotenoids in flowers of *C. maritimum*



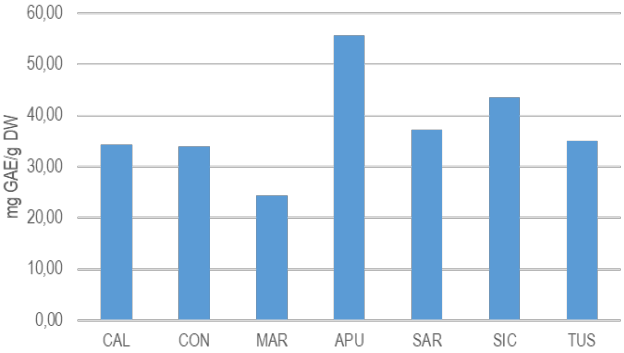
Tocopherols in leaves of *C. maritimum*



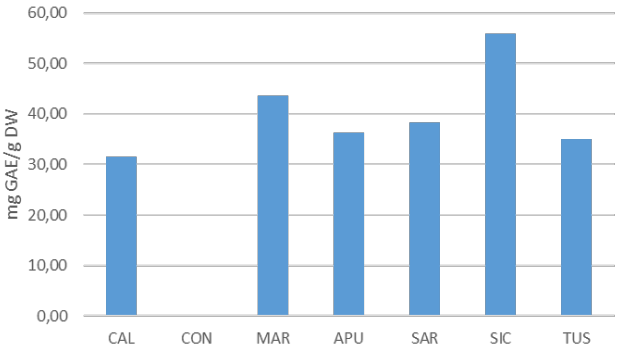
Tocopherols in flowers of *C. maritimum*



TOTAL POLYPHENOL CONTENT LEAVES



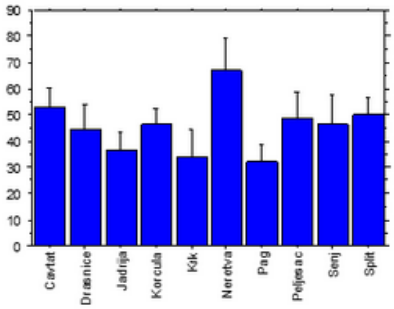
TOTAL POLYPHENOL CONTENT FLOWERS



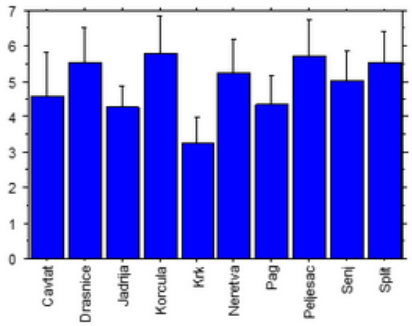
CROATIA

Ten Croatian sea fennel populations were sampled. The selected sites covered the entire coastal area, including the coast and islands, from Krk, the Northernmost site, to Cavtat, the Southernmost site, with distances between sampling sites <100 km. Also, sampling was performed on the largest Southern Island, Korčula, as well as the firth of the Neretva River, which is characterized by brackish water.

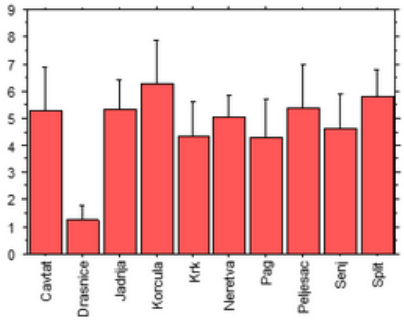
Main growth traits of collected populations are shown below.



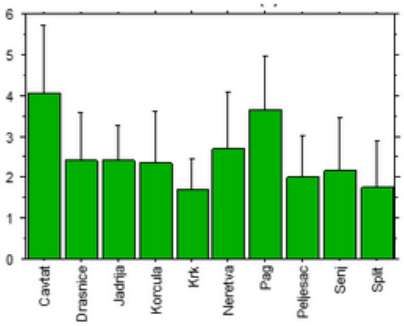
Plant height (cm)



Stem diameter (mm)



Number of branches



Number of umbells

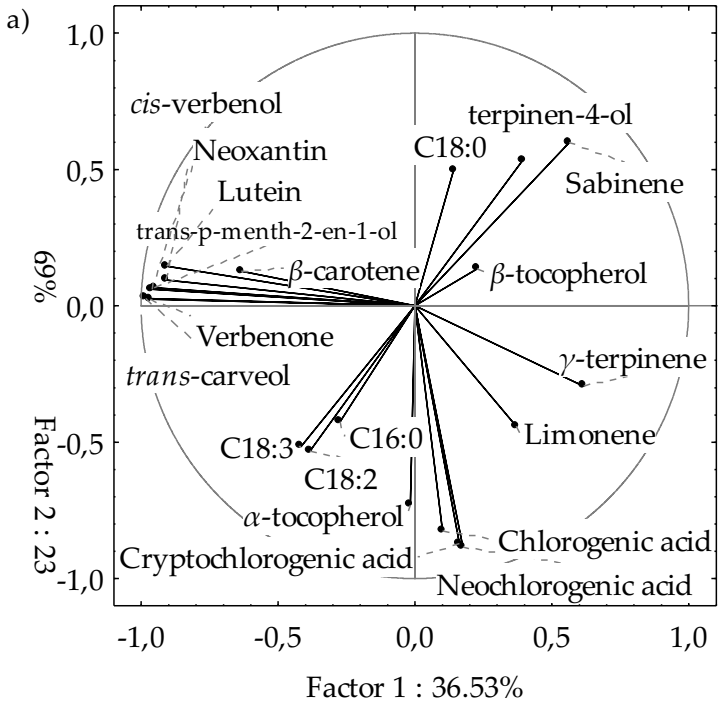
Seed traits of Croatian populations are reported below.

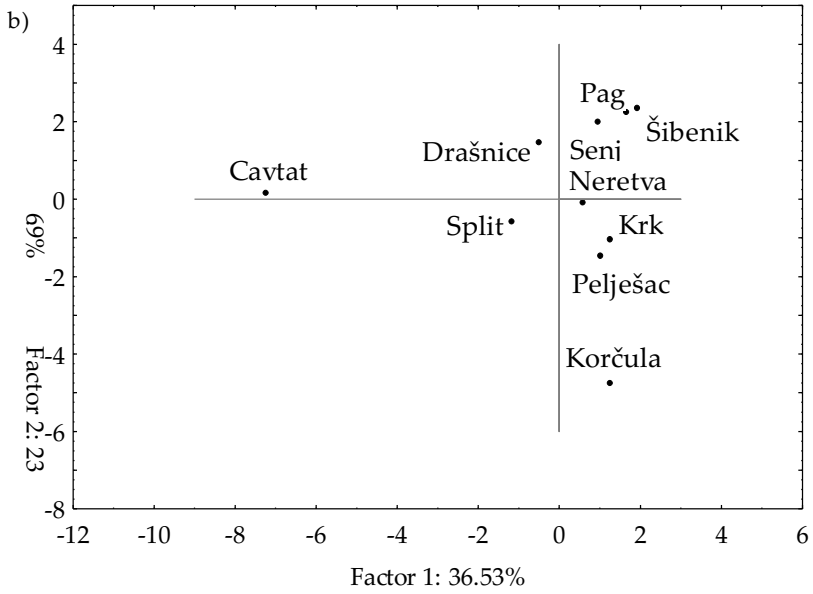
Location	Weight of 100 seeds (g)	Seed lenght (SL; mm)	Seed width (SW; mm)	SL/SW	Coefficient form
Cavtat	0.19	2.73 (2.05-3.70)	1.17 (0.90-1.48)	2.33	0..73
Drašnice	0.124	2.89 (2.16-3.70)	1.21 (0.93-1.49)	2.39	0.72
Korčula	0.08	2.69 (2.10-3.57)	1.09 (2.10-3.45)	2.47	0.7
Krk	0.091	2.61 (2.10-3.43)	1.09 (0.77-1.45)	2.39	0.72
Neretva	0.16	3.43 (2.57-4.58)	1.19 (0.90-1.53)	2.88	0.63
Pag	0.133	2.90 (2.25-3.84)	1.20 (0.92-1.57)	2.42	0.71
Pelješac	0.18	3.04 (2.25-4.02)	1.21 (0.90-1.61)	2,51	0.69
Senj	0.125	2.94 (2.33-3.59)	1.12 (1.48-0.74)	2.63	0.67
Šibenik	0.135	3.08 (2.22-4.08)	1.24 (0.99-1.55)	2.48	0.7
Split	0.174	2.74 (2.08-3.89)	1.30 (1.04-1.69)	2.11	0.77

A summary of chemical analyses are reported below.

Chemical class	Populations	Plant part	Methodology	Detected or major compounds
Phenolic compounds	All All	Leaves Flowers	HPLC-DAD	10 compounds (chlorogenic acid, neochlorogenic acid, criptochlorogenic acid and rutin)
Carotenoids	All 3 populations	Leaves Flowers	HPLC-DAD	3 compounds (neoxanthin, violaxanthin, **lutein** and β-carotene)
Fatty acids	All 3 populations	Leaves Flowers	GC-MS	21 compounds (linoleic, linolenic acid, palmitic, stearic acid)
Tocopherols	All 3 populations	Leaves Flowers	HPLC-FLD	4 compounds (**α-tocopherol**, β-, γ-, and δ-)
Essential oils/ Volatiles	All 3 populations All	Leaves Flowers Seeds	GC-MS GC-MS HS-SPME	35/15/31 compounds (monoterpenes and monoterpenoids: **limonene, sabinene**, γ-terpinene and terpinen-4-ol)

Chemical data were elaborated using statistical analysis (PCA). Correlation loadings (**a**) and score plots (**b**) of the dominant fatty acids, phenolics, essential oils and pigments in relation to sampling area are depicted below.





TUNISIA

Five different sea fennel populations located in North of Tunisia were sampled from the following sites: Bizerte (BIZ), Tabarka (TAB), Monastir (MON), Cap Negro (CN), Haouaria (HA).

Similarly to what found in other countries, statistical analysis carried out onto morphometric data showed significant differences between the morphological traits of the five Tunisian populations (seeds, leaves and whole plant). For whole plant characterization, Tabarka and Monastir showed the most developed individuals, while Hawaria showed the smallest ones; Monastir showed the most developed umbel and leaves.

Analysis of total phenolic, flavonoids and tannin content were conducted for the five Tunisian populations. The antioxidant activity was determined for all samples studied. A scientific paper was prepared and submitted to a scientific journal.

Results of total phenolic content showed significant variation between the five Tunisian populations. The highest amounts of total phenols content and condensed tanins were reached by Cap Negro, whereas Bizerte was the richest in flavonoids. The antioxidant activity ranged from 91 to 96%.

Essential oils were extracted from dried sea fennel plants collected from five Tunisian populations. Oil yields were determined. Identification of the essential oils was performed using a Hewlett Packard HP5890 series II GC-MS equipped with an HP5MS column (30 m ×0.25 mm).

The five studied oils showed differences in densities, colors and smells. Oil yield varied from 0.89% and 1.49%. Oil from Monastir showed the highest yield representing about 1.49% of the dried material. The lowest yield was reached by Bizerte locality with 0.89%. γ-terpinene was the major compound in oils from Tabarka, Cap Negro, Bizerte and Monastir Dillapiole was the major compound in oil from Hawaria The chemical composition of essential oils extracted from the different parts of the plant are under analysis.

Analysis of carotenoids and tocopherols are still ongoing. Fatty acids were extracted from sea fennel fruits. Determination of fatty acid composition is ongoing using a Gas Chromatography apparatus.

For molecular analyses, about 100 gr of leaves were collected from the 20 individuals of each Tunisian population and used for DNA extraction. Region GPS Coordinates Code Bizerte 37,25265°N, 9,94500°E BIZ Tabarka 36,95951°N, 8,75302°E TAB Cap-Negro 37,10278°N, 8,98423°E CN Haouaria 37,05143°N, 10,94242°E HA Monastir 35,78414°N, 10,83414°E MON The leaves were stored at -20°C. The DNA will be extracted using DNeasyPlant Pro Kit by Qiagennext month (November 2023).

TURKIYE

Starting from the Northern region of İzmir, the Turkish coastal areas were scanned with the mapping method, and 4 different populations were selected as sampling areas with a minimum distance of 100 km, taking care to have different geological substrates. Sample areas are within the boundaries of Çandarlı (Locality 1), Urla (Locality 2), Çeşme (Locality 3), and Seferihisar (Locality 4).

As a result of the comparative analysis, the Dikili population, which spreads on andesite rocks consisting of extrusive magmatic rocks, has the highest average values in terms of plant general width and height, number of lobes in the leaf and petiole length.
The Seferihisar population, which spreads on sedimentary sandstone-claystone mixed rocky slopes, showed the highest average values in terms of leaf length, number of flowers in the umbelula, umbel width and peduncle length.
The Urla population, which spreads on the limestone bedrock, showed the lowest average values in terms of basic morphological characters.
In the light of these data, it can be concluded that different substrates provide advantages for the better development of different characters for C. maritimum species.
For this reason, culture studies should be carried out by selecting the population showing the most ideal character traits through experiments in the field environment.

- # WP4

The Project Coordinator leaves the floor to the WP4 leader Dr Branimir Urlic from IACKR who briefly presents the on-going activities and deliverables related to production of sea fennel organic crop (with the up-to-dated list of drafted/delivered deliverables) (Annex IV). The status of the tasks and deliverables is reported below.

Tasks:

Task 4.1 (R). Sustainable production of sea fennel crop in demo field (month 6 – 24). **ON-GOING**
Task 4.2 (D). Sustainable production of sea fennel crop in open field (month 12 – 35). **ON-GOING**
Task 4.3. (D) Analysis of the new sea fennel crops (month 6 – 35). **ON-GOING**
Task 4.4. (D) Statistical analysis (month 18 – 35). **NOT STARTED**

Deliverables:

D4.1 Experimental plan design of cultivation trials (month 6); **DELIVERED IN DUE TIME ON 30TH NOVEMBER 2022.**
D4.2 Fresh biomass (edible aerial parts) from the new organic sea fennel crops (month 12); **DELAYED**
D4.3 By-products (old leaves and fibrous stems) from the new organic sea fennel crops (month 12); **DELAYED**
D4.4 Recommendations and guidelines on sustainable production of new organic sea fennel crops in the Mediterranean basin (Month 24).
D4.5 Report with the elaborated data overall collected within WP4 (month 35)

After the presentation of tasks and deliverables by Dr Branimir Urlich, representatives of each Research partner involved in WP4 show the on-going activities and main results achieved in the reporting period. A summary of these presentations is reported below.

Briefly, germination tests have been carried out by all the Partners involved in this WP, and especially by UNIBRE (France); the results of germination tests under different conditions (16h/8h day/night photoperiod, daily temperatures: continuous 23°C, continuous 15°C, or 23°C/15°C alternance) clearly suggest that the best conditions were 15°C for French seeds, 23°C/15°C alternance for Italian or Croatian provenances.

In Spring 2023, seedlings for transplantation were produced by all the Partners, except UNIVPM, from seeds collected from spontaneous populations sampled at the following locations:

ITALY (UNIVPM):
-Atlantic coast
-Marche region

CROATIA (IACKR):
-Atlantic coast
-Drasnice
-Koreula
-Znjan

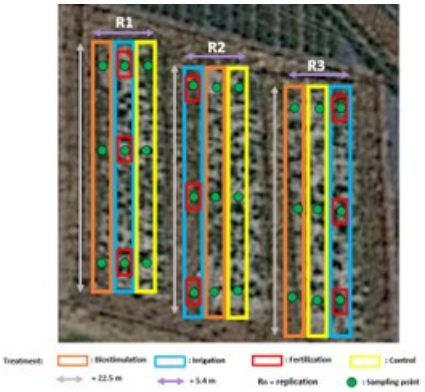
TUNISIA (INGREF):
-Atlantic coast
- Haouaria

TURKIYE (UNIEGE):
-Atlantic coast
-Candarli
-Urla

After opportune soil bed preparation, the available seedlings have been transplanted into the demo fields, in all the countries involved in WP4, except for Italy, where this activity has been delayed to 2024.

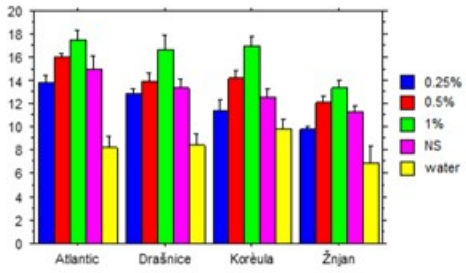
Soil chemical analyses have been completed by almost all the involved partners.

- In **Italy** a bio-fertilizer consisting of selected strains of beneficial bacteria has been formulated and applied for bacterization of sea fennel seeds saw in pots, to evaluate its impact on the root and the rhizosphere of seedlings. The preliminary data to date collected suggest a positive effect of the bio-fertilizer on key root parameters, such as root diameter, whereas no significant differences were found on the load of selected groups of microorganisms. The same biofertilizer was tested in a demo field located in Camerano (AN), onto 3-year-old sea fennel plants (transplanted from seedlings produced in 2020 from seeds of a spontaneous population growing in the Marche region). In this demo field, 4 treatments were studied: biostimulation by application of the biofertilizer; fertilization with a commercial chemical fertilizer, irrigation, and control (no irrigation, no fertilization, no biostimulation). Sea fennel fresh biomass was collected at three distinct phenological stages: (i) side shot formation; (ii) vegetative parts development; (iii) visible flower buds. The evaluation of the effect of the 4 treatments onto the rhizosphere and the crop yield is still under evaluation.



– In **Croatia**, seedlings were transplanted to a demo field in May 2022.

Different treatments with a commercial fertilizer were assayed; as a general trend, a slow growth was seen over summer 2023, though in October 2023 a preliminary analysis of the fresh biomass was carried out, as planned.



Further trials were also carried out to evaluate the effect of the pot volume onto the biomass yield.

– In **Turkiye**, seedlings were transplanted to a demo field in May 2022.
a commercial

- In **Tunisia** seedlings were transplanted into a demo field in May 2022

Unfortunately, due to a severe water drought and the very high temperatures reached in summer 2023 (up to 45°C), the young plants died (notwithstanding the emergency irrigations). A new production of seedlings for transplantation is planned for autumn 2023 – spring 2024.

- In **Turkiye**, seedlings were transplanted in May 2023; the following treatments were assayed: biofertilization and control conditions. The plants were irrigated using with a drip irrigation system. In October 2023, sea fennel aerial parts were harvested and separated into "edible portion" (sprouts, tender young leaves, and stems) and "refuse" (older leaves and fibrous stems).

- **WP5**

The Project Coordinator leaves the floor to the WP5 leader Dr Valentina Melini from CREA-AN who briefly presents the on-going activities and deliverables related to exploitation of sea fennel for manufacturing of innovative sea fennel-based foods (with the up-to-dated list of drafted/delivered deliverables) (Annex V). The status of the tasks and deliverables is reported below.

Tasks:

Task 5.1 (R) Laboratory scale manufacturing of fermented shelf-stable sea-fennel preserves at laboratory scale (month 1 – 20). **ON-GOING**
Task 5.2 (R) Laboratory-scale manufacturing of unfermented shelf-stable preserves (month 1 – 20). **ON-GOING**
Task 5.3 Pilot-scale manufacturing of fermented and unfermented shelf-stable sea-fennel preserves (D) (month 20 – 35). **NOT STARTED**

Deliverables:

D5.1 At least 2 pilot scale prototypes of sea fennel-based fermented shelf stable preserves (month 24);
D5.2 At least 2 pilot scale prototypes of sea fennel-based unfermented shelf stable preserves (month 24);
D5.3 Recommendations and guidelines for manufacturing of new sea fennel-based fermented shelf-stable preserves at pilot scale (month 35);
D5.4 Recommendations and guidelines for manufacturing of new sea fennel-based unfermented shelf-stable preserves at pilot scale (month 35);
D5.5 Report with elaborated data overall collected within WP5 (month 35)

After the presentation of tasks and deliverables by Dr Valentina Melini, representatives of the research partners involved in the WP5 show the on-going activities and main results achieved in the reporting period. A summary of these presentations is reported below.

ITALY (UNIVPM, CREA-AN, RINCI)

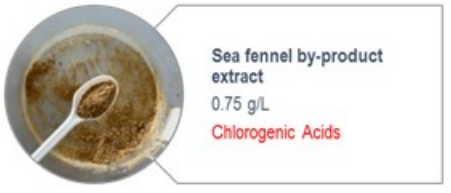
- ✓ FERMENTED PRESERVES (Task 5.1)

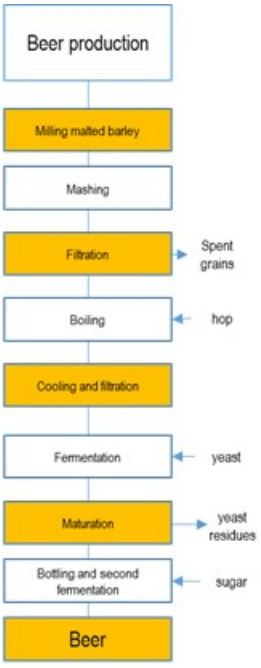
  - **Kimchi-like preserve**
  - **Pickled fermented sea fennel**

  For both the above listed innovative products, 2 production batches each consisting of 2 technical replicates were manufactured at laboratory scale using fresh sea fennel sprouts as an ingredient. The validation of these prototypes (2 batches, 4 technical replicates) through chemical, microbiological, textural, and sensory analysis are still ongoing.

  - **Beer** (addition of extracts produced in WP6 or of fresh sea fennel leaves/flowers during boiling)

  For this innovative fermented beverage, a flow chart defining the main steps and operations has been drafted, considering two alternative sea fennel-based ingredient: an extract obtained from sea fennel crop byproduct, or a sea fennel juice obtained from fresh sea fennel crop.





✓ UNFERMENTED FOODS (Task 5.2)

-Shelf-stable pesto-like

Differently from what planned, this prototype will not be produced, being replaced with the prototypes of dried sea fennel spices.

-Dried sea fennel spices

This innovative product was formulated within a previously funded research project (BIO-VEG-CONSERVE) which was aimed at exploring the potential of sea fennel as an ingredient for the manufacture of innovative foods; within the framework of the project SEAFENNEL4MED, laboratory-scale prototypes of dried sea fennel spices were produced testing 4 different drying methods (air drying at room temperature, oven drying, freeze drying, and microwave drying); hence, all the four prototypes were subjected to the analysis of chemical, microbiological, and sensory parameters as well as colour and organic volatile compounds (VOCs).

CROATIA

✓ UNFERMENTED FOODS (Task 5.2)

- Dried spices

Dried spices were formulated with blends of sea fennel and other Mediterranean aromatic herbs, being rosemary, fennel, bay laurel, subjected to drying at 50°C for 4-6 h. The resulting powders were subjected to the analysis of: granulometric traits, color, aroma (VOCs), phenolic compounds, antioxidant activity, antimicrobial activity. They will also be assayed for their oxidative stability after application in different food models.


- Dalmatian patée

Five recipes of Dalmatian patéè were formulated using the following ingredients: sea fennel (cooked or pickled), olives (green and black), pickled onions, olive oil.






Validation analyses are on-going.

- Pickled unfermented sea fennel

Laboratory-scale prototypes of pickled sea fennel were formulated using different vinegars: apple cider vinegar, red wine vinegar, alcoholic vinegar. Stabilization was achieved by pasteurization at 95°C for 15 min. The following analyses were carried out: chemical composition, aroma, color, texture, and taste. The stability during the shelf-life is still ongoing.



- Vegetable oils aromatized with sea fennel.

The addition of sea fennel (as dried powder or dried leaves at the following ratio: 1 g of sea fennel into 100 mL of oil) to different vegetable oils (olive oil, sesame oil, sunflower oil, flaxseed oil) to improve oxidative stability and aroma was assayed during 90-day shelf life at room temperature. The following analysis are on-going: determination of free fatty acids (FFA, %), peroxide number (PN, mmol O_{22}-/kg), fatty acid profile, VOCs.

TUNISIA

✓ UNFERMENTED FOODS (Task 5.2)

-Chili puree (Harissa)

The formulation of chili puree was made based on a popular traditional recipe. The main ingredients used were dried pepper (50%), garlic (35%), preparation (salt, coriander, caraway) (15%). Different doses of sea fennel powder were added to harissa to determine the best concentration. Analyses of stability, expiry date and microbiological analyses were carried out. A sensory analysis is also in progress with a panel of experts.

-Orange jam

Sea fennel was incorporated as a powder at different doses (0.5%, 1%, 1.5% and 2%) with the aim of assessing the effect of sea fennel on stability and taste of orange jam. Analyses of stability (pH, Brix evolution and microbiological load of yeasts, molds, and mesophilic aerobes over 60 days at 20 and 37°C, were carried out. A sensory analysis is also in progress with a panel of experts.

-Noodles prepared with durum semolina added with 5% or 10% sea fennel powder.

No activities were carried out in the reporting period for this prototype.

TURKIYE

✓ UNFERMENTED FOODS (Task 5.2)

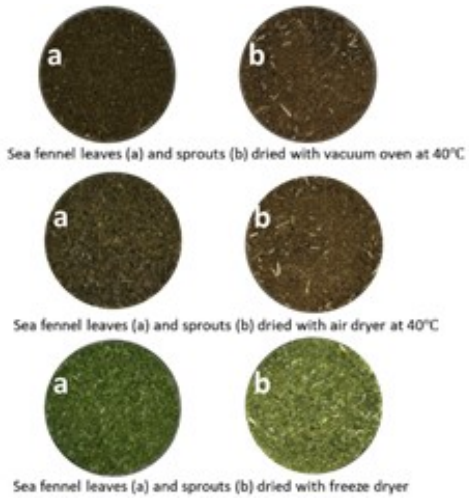
- **Hand made pasta**

  Different laboratory-scale prototypes of hand made pasta were produced with durum semolina and sea fennel powder added at different levels.

  The following properties were evaluated: optimum cooking time, cooking loss, Swelling Index, Water Absorption, Texture Analysis, Sensory Evaluation

- **Dried sea fennel**

  Different drying methods were assayed: vacuum drying, freeze drying, hot air drying. The following parameters were analysed: color, water activity, total antioxidant activity, total phenolic content.



- **Snacks obtained by extrusion starting from (a) doughs made with sea fennel and other ingredients and (b) stuffed with sea fennel cream.**

  Laboratory-scale prototypes of both products have been produced; their characterization is ongoing.


- **Spiced noodles with sea fennel**

No activities have been carried out in the reporting period for this prototype.

• WP6

The Project Coordinator leaves the floor to the WP6 leader Prof Christian Magné from UNIBRE who briefly presents the on-going activities and deliverables related to valorisation of sea fennel crop by-products for production of functional food ingredients/nutraceuticals/soil amendments (with the up-to-dated list of drafted/delivered deliverables) (Annex VI). The status of the tasks and deliverables is reported below.

Tasks:

Task 6.1 (R&D). Preparation and analysis of extracts from see fennel crop by-products (month 12 – 18). **ON-GOING**
Task 6.2 (R&D) Exploitation of the extracts as functional food ingredients and nutraceuticals (month 18 – 24). **ON-GOING**
Task 6.3 (R&D) Composting of residual sea fennel biomass (month 24 – 35). **NOT STARTED**
New Task 6.4 **(R&D)** Production, analysis, and exploitation of essential oils (EOs) from sea fennel as food ingredients with antimicrobial activity/beneficial properties applied to the manufacture of Mediterranean foods (e.g.: cheeses, fermented sausages, ect). (month 24 – 35) **NOT STARTED**

Deliverables:

D6.1 At least 1 crude extract with antioxidant, antimicrobial and/or health-beneficial activity (month 18); **DELIVERED ON DUE TIME ON 30TH NOVEMBER 2023**
D6.2 Recommendations and guidelines for preparation of crude extracts with antioxidant, antimicrobial and/or health-beneficial activity from sea fennel (month 18). **DELIVERED ON DUE TIME ON 30TH NOVEMBER 2023**
D6.3 At least 1 soil amendment produced by composting of sea fennel crop residual biomass (month 35);
D6.4 Recommendations and guidelines for preparation of soil amendment by composting of sea fennel residual biomass (month 35);
D6.5 Report with elaborated data overall collected within WP6 (month 35)

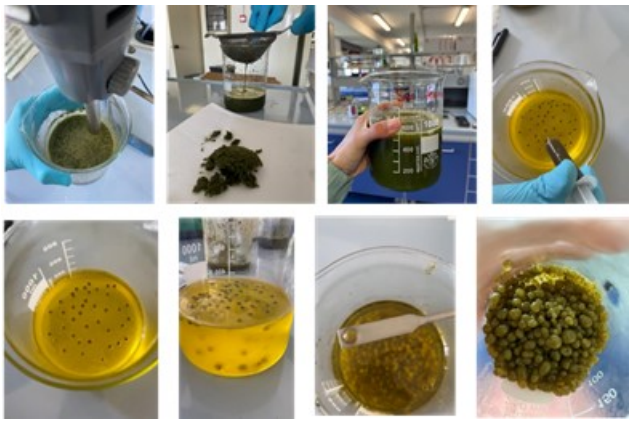
After the presentation of tasks and deliverables by Dr Christian Magné, representatives of Research partner involved in WP6 show the on-going activities and main results achieved in the reporting period. A summary of these presentations is reported below.

More in detail, regarding the formulation of **NEW FOOD INGREDIENTS,** the activities proposed by each Consortium Partner and those carried out in the reporting period are listed and detailed, respectively.

ITALY (UNIVPM, CREA-AN, RINCI)

- production of extracts with polar bioactive compounds and analysis of their chemical, antioxidant, and antimicrobial activities (the latter towards key foodborne pathogens: *Escherichia coli*, *Staphylococcus aureus*, *Listeria innocua*)
- production and validation of seasoning edible capsules (from the extracts produced in T6.1 or essential oils produced in T6.3) e.g., example balsamic Modena vinegar (spherification process using sodium alginate)
- application of essential oils produced in T6.3 into the production of fermented salami (es. Ciauscolo salami) to improve sensory traits/safety/functional properties.
- application of essential oils produced in T6.3 into the production of meat-based products (e.g., hamburger) to improve sensory traits/safety/functional properties (example 3)

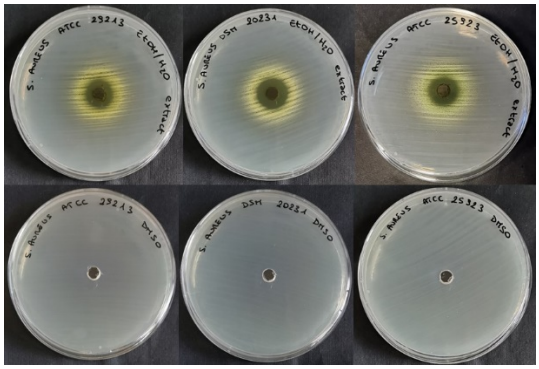
In the reporting period, a procedure to produce water and ethanol extracts from sea fennel by-product was optimized and then applied to crop byproducts purchased by RINCI.
The water extracts were assayed for total phenolic content (TPC), total flavonoid content (TFC), and total carotenoids content (TCC) and antioxidant activity by DPPH, ABTS and FRAP tests. The same extracts were also assayed for their inhibitory activity against carbohydrate-hydrolysing enzymes and lipase. Finally, major hydroxycinnamic acids such as chlorogenic acids were quantified by ultra-high-performance liquid chromatography coupled with the photodiode array (UPLC/PDA).
The application of water extracts from sea fennel byproducts to production of seasoning edible capsules by spherification was also explored in the reporting period, but it still needs optimization.



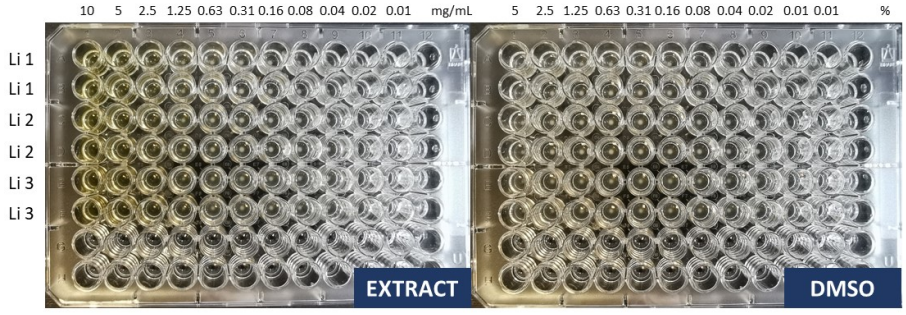
The analyses for validation of edible capsules are currently ongoing.

Regarding the evaluation of the antimicrobial activity of the sea fennel extracts in water and ethanol carried out at UNIVPM, the following indicator microorganisms were used:
Staphylococcus aureus (strains ATCC 29213, DSM 20231, ATCC 25923), *Listeria innocua* (strains Li 1, Li 2, Li 3), *Escherichia coli* (strains ATCC 25922, EC 2).
Briefly, the water extract was dissolved in water (400 mg/mL) and analysed through the agar well diffusion assay (adding 50 µL of resuspended extract) for measuring the inhibition zone diameters and broth microdilution assay for minimum inhibitory concentration determination (MIC), whereas, the ethanol extract was dissolved in dimethyl sulfoxide (200 mg/mL) and assayed through the agar well diffusion method (adding 50 µL of resuspended extract), agar dilution method and broth microdilution method for the determination of inhibition zone diameters, minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC), respectively. The water extract did not produce any inhibition growth zones towards any of the tested strains and was characterized by MIC values > 100 mg/mL against all the strains. The ethanol extract showed a higher inhibition growth zone toward the strain *S. aureus* DSM 20231 (4.50±0.00 mm) and determined comparable inhibition growth zones toward the other two strains of *S. aureus* (ATCC 29213: 3.31±0.09 mm, ATCC 25923: 3.13±0.00 mm) and the three strains of *L. innocua* (Li 1: 3.00±0.18 mm, Li 2: 3.13±0.00 mm, Li 3: 3.19±0.27 mm). No inhibition was observed toward *E. coli*. Regarding the minimum inhibitory concentration, the value

of 2.5 mg/mL was recorded against *S. aureus* ATCC 29213 and DSM 20231, whereas the value 5 mg/mL was determined toward *S. aureus* ATCC 25923 and the three strains of *L. innocua*. MIC values > 10 mg/mL were recorded against *E. coli*. Finally, a minimum bactericidal concentration of 10 mg/mL was measured toward *S. aureus* ATCC 29213 and DSM 20231, whereas values > 10 mg/mL were reported for all the other strains.



agar well diffusion assay



broth microdilution assay

CROATIA (UNIST)

- extraction and analysis of essential oils (EOs) at laboratory scale;
- addition of EOs to different vegetable oils to prevent their degradation (oxidation) and as flavour components.

In the reporting period, UNIST has explored different green extraction technologies (i.e., ultrasound, microwave) using water/ethanol mixtures to produce extracts from sea fennel leaves, flowers, stems, and seeds, under different conditions (e.g., % of ethanol, extraction temperature, treatment); the extracts (>3) have been assayed for their antioxidant/antimicrobial activities.

Plant part	Target compounds	Detection method	Extraction method
Leaves	Phenolics EO components VOCs	HPLC-DAD GC-MS GC-MS	• Conventional extraction, Microwave-assisted extraction, Ultrasound-assisted extraction, Accelerated solvent extraction • Hydrodistillation, Microwave-assisted hydrodistillation • HS-SPME (Hydrolates)
Flower	Phenolics EO components/VOCs	HPLC-DAD GC-MS	• Hydrodistillation (EOs, hydrolates, residual waste water)
Stems	Phenolics EO components/VOCs	HPLC-DAD GC-MS	• Hydrodistillation (EOs, hydrolates, residual waste water)
Seeds	VOCs	GC-MS	• HS-SPME

TUNISIA (INGREF)

- extraction and analysis of essential oils (EOs);
- application of EOs as food ingredients to improve quality/shelf-life of jelly candies.

Regarding the formulation of **NUTRACEUTICALS:**

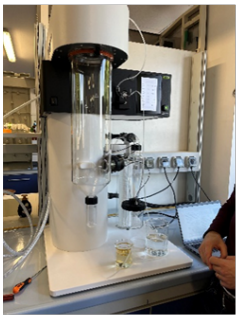
ITALY (UNIVPM, CREA-AN, RINCI)

- Application of the extracts with polar bioactive compounds to produce a new nutraceutical product and validation.

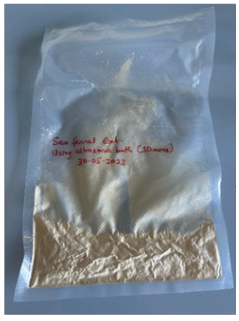
In the reporting period, water extracts from sea fennel crop byproducts containing polar bioactive compounds were subjected to an optimized spray drying procedure to produce a new nutraceutical. The analyses of the new spray-dried dietary supplement are currently ongoing.

By-product

Extract



Spray-drying



Spray-dried extract + maltodextrin

FRANCE (UNIBRE)

- analysis of beneficial effects of the watery extracts with polar bioactive compounds on the human health: antidiabetic and anti-inflammatory activity (UNIBRE is available for carrying out these analyses on the extracts produced by the different CONSORTIUM partners)

In the reporting period, UNIBRE has carried out the hydro-ethanolic (70:30 v/v) extraction of sea fennel powder from fresh sea fennel leaves, flowers, and seeds of 5 different provenances (CR, FR, IT, TUN, TUR). From the analysis of

these extracts it emerges that: (i) no phenolic compounds were found in the hydro-ethanolic extracts of Turkish sea fennel wild populations, whereas those of the Croatian populations showed low levels of these compounds; (ii) the extracts of French (Fra) and Italian (Ita) populations were the richest in chlorogenic acid, particularly the extracts produced from the flowers; however, no chlorogenic acid was never detected in the extracts from the fruit envelope. Moreover, a very low antioxidant activity was found in the hydro-ethanolic extracts of the Turkish and Tunisian populations, whereas the extracts from the French and Italian populations were the most active (especially those obtained from flowers and leaves.
Anti-tyrosinase, anti-elastase, and anti-collagenase acitivities were also measured in the hydro-ethanolic extracts from leaves and flowers of all the provenances. Anti-tyrosinase activity follows antioxidant activities: no anti-tyrosinase activity was seen in the Turkish populations; by contrast, a strong anti-tyrosinase activity was seen in the French and Italian populations (e.g., 234 mgKAE/gDW in the French extract). No anti-elastase nor anti-collagenase activities were found in the different provenances. Anti-inflammatory activity of the different provenances is under evaluation. The freeze-dried extracts have been sent to Centro de Ciências do Mar (CCMAR, Faro, Portugal) for the evaluation (in kind) of additional medicinal properties: neuroprotection, antiobesity and antidiabetic activity.
Hydro-ethanolic extracts (and essential oils) from sea fennel by-products (old leaves and stems, flowers) of each provenance have also been produced by UNIBRE; they will be soon analysed for: (i) anti-diabetic, anti-obesity, and neuroprotective activities (collaboration with CCMAR Faro, Portugal); (ii).anti-inflammatory activity (cytokine production by elicited cell lines).

TUNISIA (INGREF)

- produce EOs and extracts from sea fennel by-products;
- test the antioxidant, anti-diabetic, antifungal, and antibacterial effects of aqueous extracts and EOs of sea fennel by-products;
- application of EOs as food ingredients to improve quality/shelf-life of jelly candies;
- use of sea fennel by-products in animal feed formulas (concentrates or vegetable flours) based on sea fennel or mixed with other products, to test their effectiveness on average daily gain (for the ruminants);
- use of sea fennel aqueous extracts for animal nutrition and evaluation of its effect on meat quality.

In the reporting period, EO was obtained from sea fennel by-product collected from wild plants (flowers, stems, and old leaves) by INGREF. Identification of the essential oils was per-formed using a Hewlett Packard HP5890 series II GC-MS equipped with an HP5MS column (30 m ×0.25 mm).
EOs showed an important inhibition of alpha amylase. The inhibition rate was estimated to be 82.81%. The evaluation of the EO antifungal, antioxidant, and antibacterial activities are ongoing.
Woody stems, old leaves, and flowers of sea fennel plants collected in September 2023 were dried, and the powder used the production of extracts with different solvents (ethanol, methanol, acetone, water).
As a result, the aqueous extract showed the highest extract yield while acetone extract showed the lowest yield. Moreover, the extract in acetone showed the highest content of total phenols, total flavonoids, and condensed tannins. For the antioxidant activity, the methanolic extract showed the highest value (80%) while the aqueous extract showed the lowest one (36%). Regarding the alpha amylase inhibition, the ethanolic extract showed the highest inhibition. No activity was recorded for the extracts obtained with acetone and water. All the extracts showed an inhibitory effect against all the test microorganisms (moulds) used. Amon them, *Alternaria alternata* was the most sensitive whereas *Ulocladium atrum* was the most resistant. Regarding the anti-inflamatory activity, the hignest inhibitory effect of albumin was recorded by the aqueous extract (60%). The evaluation of the chemical composition and antibacterial activity of these extracts is still ongoing.

Regarding the application of EOs as food ingredient, the formulation of jelly candies has been defined and different doses of sea fennel EOs were added to the candies. A preliminary physical and physicochemical characterization of candies was carried out.

No activities were carried out by INGREF in the reporting period for the use of sea fennel by-products and aqueous extracts in animal nutrition.

TURKIYE (UNIEGE)

- Encapsulation of standardized crude extract with polar bioactive compounds (one extract obtained at optimum extraction conditions) in micro- and nano-carriers and evaluation of stability (UV, heat).
- Evaluation of health-beneficial traits of a standardized crude extract with polar bioactive compounds (one extract obtained at optimum extraction conditions): anti-diabetic effects using enzyme (alfa-glucosidase) inhibition assays.
- Preparation of mucoadhesive oral films (oral strips) at lab scale for the buccal delivery of polar bioactive compounds in standardized crude extract (only for one extract obtained at optimum extraction conditions).
- Evaluation of the synergistic effects of a standardized crude extract with polar bioactive compounds (one extract obtained at optimum extraction conditions) with selected bio-enhancers.

No activities were carried out by UNIEGE in the reporting period for this WP.

Regarding the production of **SOIL AMENDANTS:**

CROATIA (IACKR)

- Laboratory-scale composting trials with the residues of sea fennel biomass after extraction of polar/ nonpolar bioactive compounds

No activities were carried out by IACKR in the reporting period for the use of sea fennel by-products in composting.

• WP7

The Project Coordinator leaves the floor to the WP7 leader Prof. Ozlem Uysal from UNIEGE who briefly presents the on-going activities and deliverables related to demonstration of socio-economic benefits of the proposed innovations (with the up-to-dated list of drafted/delivered deliverables) (Annex VII). The status of the tasks and deliverables is reported below.

Tasks:

Task 7.1 (D) Identification of drivers and lock-ins for the development of sea-fennel products (month 1– 12). **ON-GOING**
Task 7.2 (D) Assessment of consumer attitudes and acceptance of sea fennel products (month 13–30). **ON-GOING**
Task 7.3 (D) Business model evaluation (month 24 – 35). **NOT STARTED**

Deliverables:

D7.1 Lock-ins and drivers for the development of sea-fennel products (month 12); **DELAYED**
D7.2 Report on consumer research on the attitudes and acceptance of sea-fennel products (month 30);
D7.3 Report on Business Model Evaluation (month 35)

After the presentation of tasks and deliverables by Prof. Ozlem Karahan UysalUysalUysal, she shows the on-going activities and main results achieved in the reporting period. A summary of this presentation is reported below.

During the current reporting period, the first round of the Delphi expert survey was conducted.

In each partner country, an average of 15 experts identified through the stakeholder platform (Task 2.2) were contacted by phone and informed about the study by members of the respective partner institutions (UNIVPM, IACKR, INGREF, UNIBRE, EGE).

Those who agreed to participate in a series of survey rounds were included in the participant list and an email with a link to the online survey site was sent to all of them on May 30th, 2023.

The expert groups approached in each country consisted of farmers, processors, retailers, consulting, control and certification professionals, academicians, public researchers.

The questionnaire of the first round of Delphi was sent to 15 experts from Italy, 14 experts from France, 14 experts from Croatia, 15 experts from Turkey and 16 experts from Tunisia.

Due to limited number of responses in the first launch, reminders have been sent several times during June and July 2023, along with supporting phone calls by the partner institutions involved. Finally, out of the total of 74 experts contacted, 48.65% returned the completed question form.

9 experts from Turkey, 6 experts from Croatia, 10 experts from Italy, 9 experts from Tunisia, 2 experts from France responded first round of the Delphi survey. A total of 36 experts were surveyed.

In the Delphi first round questionnaire:

Seven open-ended questions prepared to open the subject and discover as wide a range of perspectives as possible were asked to the experts.

Besides, demographic data (age, gender, education, experience in the sector, etc.) were collected.

These Delphi first round questions were sent to the experts, and they were asked to list their thoughts and answers to each question.

The data were collected via Qualtrics online survey website (Qualtrics software) which is used to collect and analyse data for market research, customer satisfaction and loyalty, product and concept testing, employee evaluations and website feedback using various distribution methods.

After the compilation of the first round, the study on the second round of the Delphi survey was initiated.

The purpose of the second round is to allow the experts to react to each other's assessments.

To this end, the answers of all country experts to the questions (except the question #5, since it was already a numeric question) posed to them in the first round were aggregated and listed one below the other.

Similar answers and expressions were grouped and combined.

Then statements were set up to be used in the second round. Each item was transformed into a structure that could be evaluated using a 5-point Likert-type scale. Statements were reviewed to be optimized and duplications were reduced to a single statement. Too specific ones were eliminated.

As well as the 1st round, the preparation of the second round Delphi questionnaire was carried out in close cooperation with the University of Ancona through e-mail correspondence and online meetings.

Currently, the second round Delphi expert question form is finalized and started to be translated into each country's native language.

The second round Delphi questionnaire will be sent to the same experts who responded to the first-round questionnaires.

- **WP8**

The Project Coordinator leaves the floor to the WP8 leader Prof. Daniele Duca from UNIVPM who briefly presents the on-going activities and deliverables related to demonstration of environmental benefits of the proposed innovations (with the up-to-dated list of drafted/delivered deliverables) (Annex VIII). The status of the tasks and deliverables is reported below.

Tasks:

Task 8.1 (D) Sustainability assessment of sea fennel open field production (month 1-35). **ON-GOING**
Task 8.2 (D Sustainability assessment of new sea fennel-based foods/food ingredients (month 1-35). **ON-GOING**
Task 8.3 (D) Sustainability assessment of functional extracts for food ingredients/nutraceuticals (month 1- 35). **ON-GOING**

Deliverables:

D8.1 Report on sustainability assessment of fresh sea fennel carried out by LCA from data collected thanks to WP4 activities (month 35);
D8.2 Report on sustainability assessment of processed sea fennel products carried out by LCA from data collected thanks to WP5 activities (month 35);
D8.3 Report on sustainability assessment of sea fennel residues extracts from data collected thanks to WP6 activities (month 35)
After the presentation of tasks and deliverables by Prof. Daniele Duca, he leaves the floor to Dr Kofi Armah Boakye-Yiadom for the presentation of the on-going activities and main results achieved in the reporting period by UNIVPM for WP8. A summary of his presentation is reported below.

Regarding the first task (T8.1), LCA analysis is at its final step, being interpretation. For the second task (T8.2), LCA is at the second step of LCA, being the inventory analysis.
Finally, regarding T8.3, LCA has just started with the definition of goal and scope.
The preliminary results of sustainability assessment of sea fennel open field production clearly suggest that:

- Organic open-field cultivation of sea fennel has a relatively low environmental impact.
- The main contributing input (material) was the plastic mulch.
- Increasing plastic recycling rate can substantially reduce environmental impacts.
- Substitution with alternative mulches like soil biodegradable mulch may improve environmental performance.
- Other emerging environmental concerns, such as microplastic pollution are currently not included in the impact assessment models.

- **OTHER ISSUES TO BE DISCUSSED**

Thanks to the input of some PIs, the Coordinator reminds the importance to take note of the master/doctoral thesis works of students involved in the SEAFENNEL4MED PROJECT; the complete list will be reported in the mid-term and final report to valorise this dissemination activity, as well.

As there was nothing else to discuss, the project Coordinator declares the session closed at 18.45.

SEAFENNEL4MED Project Coordinator

Prof. Dr Lucia Aquilanti