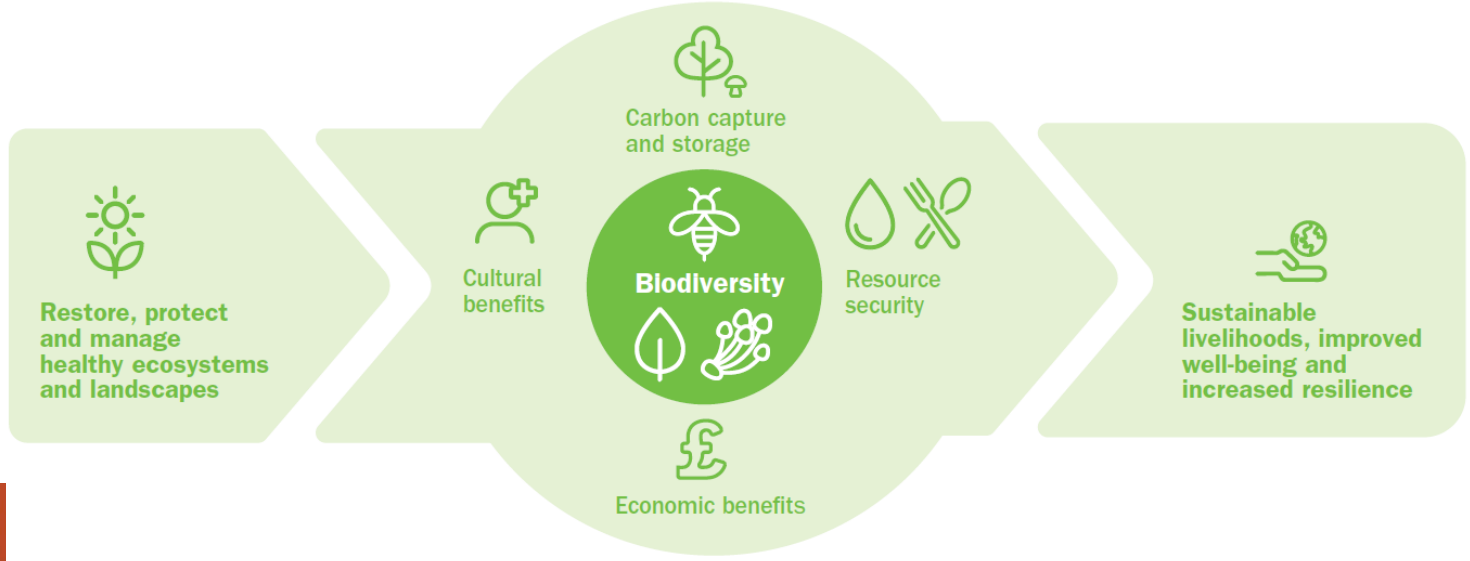
# Towards a new participative approach to the conservation of Mediterranean Wild Edible Plants

Benedetta Gori[1,2,3,4], Marco Porceddu[1,3,4], Tiziana Ulian[2], Gianluigi Bacchetta[1,3,4]

1. Università degli studi di Cagliari (Sardinia, Italy)
2. Royal Botanic Gardens, Kew. (London, United Kingdom)
3. Centre for Biodiversity Conservation (CCB)
4. Sardinian Germplasm Bank (BG-SAR)

Funded by: Università degli studi di Cagliari
In collaboration with: ResMed Project ("Restoring the traditional Mediterranean diet through the conservation of wild edible plants")

# Background





RBG Kew, 2023, "State of the World's Plants and Fungi"

- The collection and consumption of wild edible plants (WEPs), also known as foraging or phytoalimurgy, have historically characterized the culture of Mediterranean populations.

- Significant changes in food systems and markets in recent decades have led to the progressive abandonment of this practice and loss of Traditional Ecological Knowledge (TEK), along with the increasing degradation of the natural habitats where WEPs are usually found.

- **Today, more 2 out of 5 plant species are at risk of extinction** (Kew, 2023). The concept of "conservation through use" argues that biodiversity conservation can and should be promoted through the utilization of wild natural resources.

Ecological Economics 120 (2015) 303–311

Contents lists available at ScienceDirect

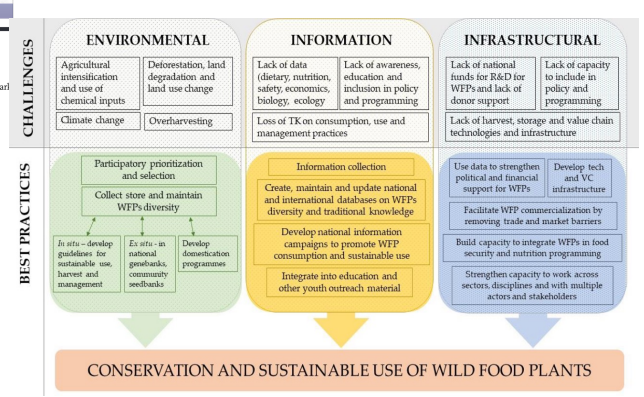
Ecological Economics

journal homepage: www.elsevier.com/locate/ecolecon

Surveys

From famine foods to delicatessen: Interpreting trends in the use of wild edible plants through cultural ecosystem services

Victoria Reyes-García [a,b,*], Gorka Menendez-Baceta [c], Laura Aceituno-Mata [c], Rufino Acosta-Naranjo [d], Laura Calvet-Mir [b,e], Pablo Domínguez [b], Teresa Garnatje [f], Erik Gómez-Baggethun [b,g], Manuel Molina-Bustamante [c], Marta Molina [d], Ramón Rodríguez-Franco [d], Ginesta Serrasolses [h], Joan Vallès [h], Manuel Pardo-de-Santayana [c]

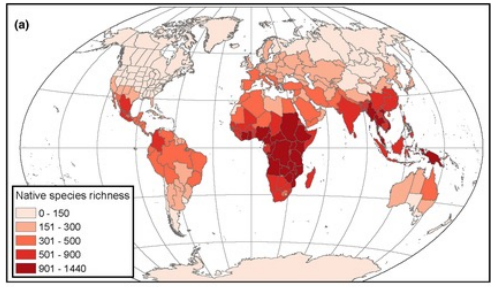



*plants*

*Review*

**Born to Eat Wild: An Integrated Conservation Approach to Secure Wild Food Plants for Food Security and Nutrition**

Teresa Borelli [1,*], Danny Hunter [1], Bronwen Powell [2], Tiziana Ulian [3], Efisio Mattana [3], Céline Termote [1], Lukas Pawera [4,5], Daniela Beltrame [6], Daniela Penafiel [7,8], Ayfer Tan [9], Mary Taylor [10] and Johannes Engels [1]




frontiers | Frontiers in Sustainable Food Systems

Wild leafy vegetables: A potential source for a traditional Mediterranean food from Lebanon

Safaa Baydoun[1]*, Nizar Hani[2,3], Hatem Nasser[2], Tiziana Ulian[4] and Nelly Arnold-Apostolides[2]

Plants People Planet

REVIEW ARTICLE | Open Access

Unlocking plant resources to support food security and promote sustainable agriculture

Tiziana Ulian, Mauricio Diazgranados, Samuel Pironon, Stefano Padulosi, Udayangani Liu, Lee Davies, Melanie-Jayne R. Howes, James S. Borrell, Ian Ondo, Oscar A. Pérez-Escobar, Suzanne Sharrock, Philippa Ryan, Danny Hunter, Mark A. Lee, Charles Barstow, Łukasz Łuczaj, Andrea Pieroni, Rodrigo Cámara-Leret, Arshiya Noorani, Chikelu Mba, Rémi Nono Womdim, Hafiz Muminjanov, Alexandre Antonelli, Hugh W. Pritchard, Efisio Mattana ... See fewer authors

nature plants

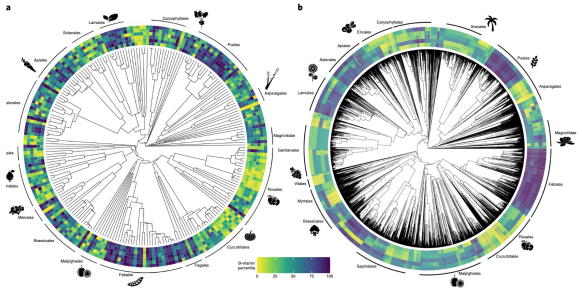
ARTICLES

https://doi.org/10.1038/s41477-022-01100-6

Check for updates

**Global plant diversity as a reservoir of micronutrients for humanity**

Aoife Cantwell-Jones [1]✉, Jenny Ball[2], David Collar[3], Mauricio Diazgranados[2], Ruben Douglas[2], Félix Forest[2], Julie Hawkins [4], Melanie-Jayne R. Howes [2,5], Tiziana Ulian[2], Bapu Vaitla[6] and Samuel Pironon [2]✉



# Why (Mediterranean) WEPs?

- Promotion of diet diversification, nutritional security, and food sovereignty.
- Climate-smart: high resilience and adaptability to environmental changes.
- Establishment of new sustainable livelihoods.
- Potential alternative to more destructive uses of natural ecosystems.
- Rooted in local cultural identity and traditional practices → bio-cultural conservation.

# Our approach

Knowledge gap

Loss of Traditional Ecological Knowledge

Vulnerable food systems

## Methods

Combination of international open-source datasets & extensive literature review (Scopus)

Geopoints retrieval (GBIF) and cleaning. Spatial analysis & biodiversity quantifications (ArcGIS pro)

Ethnobotanical investigation, selection of priority species

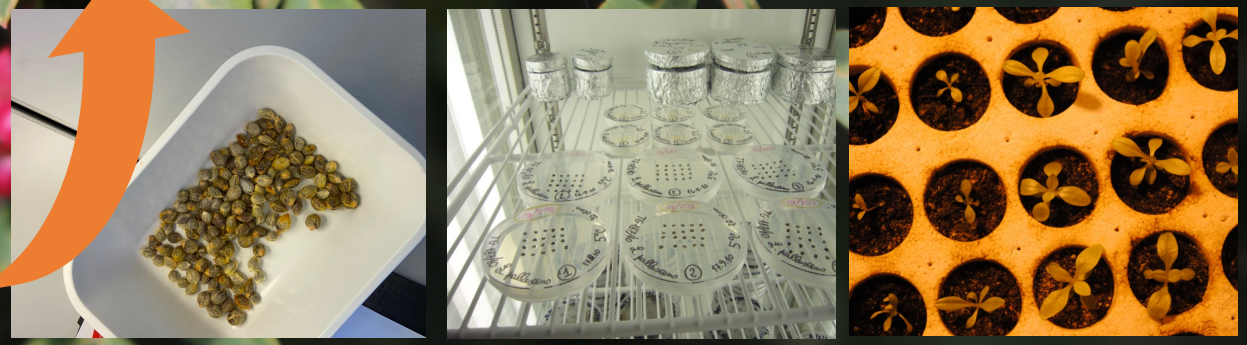
Seed collection, germination test, modelling

## Objectives

Creation of the first comprehensive dataset for the Mediterranean wild edible flora. Identification of knowledge gaps

Mapping of species distribution across Mediterranean countries and bioregions. Identification of "food biodiversity hotspots" and areas of conservation priority.

Understand species' regeneration capacity under various climate-change scenarios. Highlight their potential for propagation, domestication, and crop improvement



Germination tests in the Sardinian Germoplasm Bank (BG-SAR)

# Our approach

**1.** What is the taxonomic diversity of WEPs in the Mediterranean basin? What is its biogeographic distribution across bioregions?

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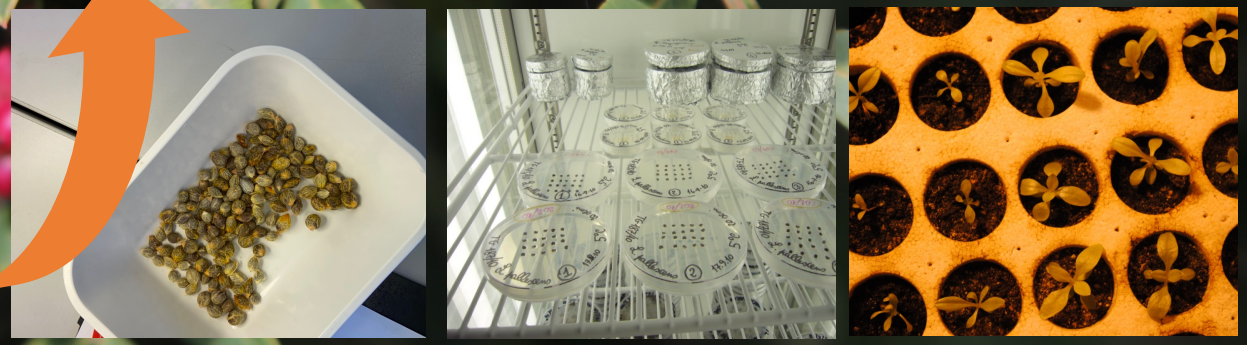

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**1.** What is the taxonomic diversity of WEPs in the Mediterranean basin? What is its biogeographic distribution across bioregions?

**2.** What is the TEK around the use of WEPs at the Mediterranean level? What patterns can be identified?

Vulnerable food systems

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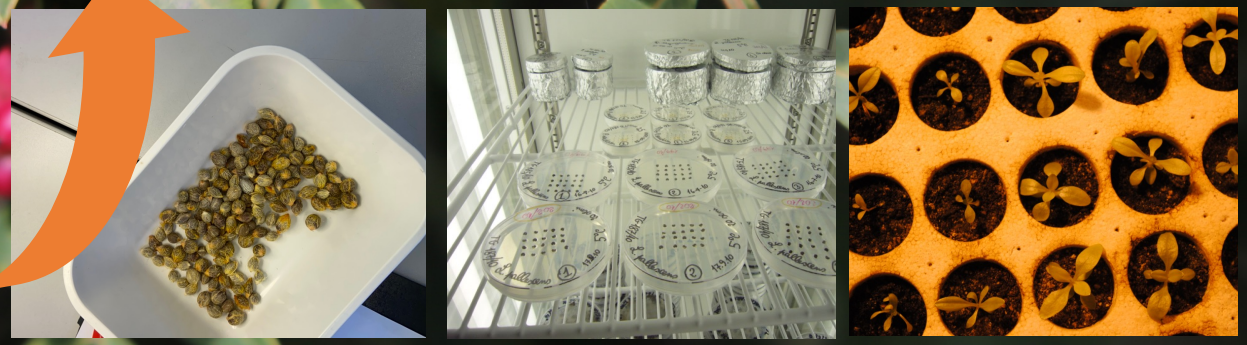

Germination tests in the Sardinian Germoplasm Bank (BG-SAR)

# Our approach

1. What is the taxonomic diversity of WEPs in the Mediterranean basin? What is its biogeographic distribution across bioregions?

2. What is the TEK around the use of WEPs at the Mediterranean level? What patterns can be identified?

3. What species can be prioritised for enhanced use or conservation? How will their distribution be impacted by future climatic changes?

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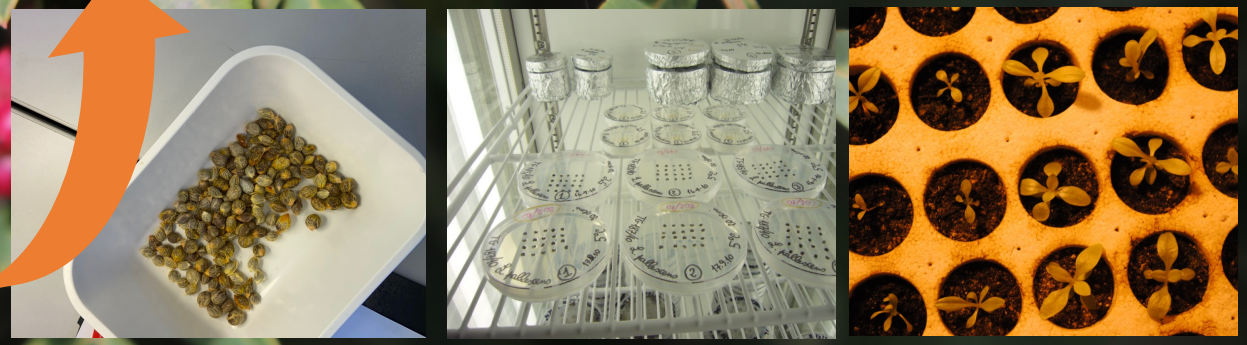


Germination tests in the Sardinian Germoplasm Bank (BG-SAR)

# Literature review


Diazgranados, M., Allkin, B., Black, N., Cámara-Leret, R., Canteiro, C., Carretero, J., et al. (2020). World checklist of useful plant species.

- Databases searched: Scopus, Scholar, Web of Science *(Elsevier, Wiley, JSTOR, EBSCO, Springer, Taylor & Frances + Grey literature)*
- Period of publication: 1950 - Present
- Countries: Italy, Greece, Albania, Bosnia, Montenegro, Croatia, Slovenia, France, Spain, Portugal, Morocco, Turkey, Cyprus, Syria, Lebanon, Israel, Jordan, Palestine, Egypt, Libya, Tunisia, Algeria
- Disciplines: Ethnobotany, Physiology, Ecology, Genomics, Agriculture, History, Anthropology, Archaeobotany
- Nature of the studies: Universities, Research institutions, private companies, NGOs

**Search results:**

- Prelim. results: 2.011
- Discarded (duplicates & abstract): 1.551
- Final results: 460

| ID | Species_name | Author_name | Subspecific_epithet | Vernacular_name | Country | Specitif_place | Plant_part | Food_detail | Medicinal_u | Detail | Reference | CWR | WEP | Publication_type |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3738 | Capparis spinosa | L. | | Chiapparo | Italy | Cava de tirreni a | bulbs | used to arom | NA | NA | Mautone, M | NA | Yes | Ethnobotany |
| 3739 | Achillea millefolium | L. | | Troneto | Italy | Cava de tirreni a | inflorescenc | used for prep | Medicinal | the inhalatic | Mautone, M | NA | Yes | Ethnobotany |
| 3740 | Artemisia absinthium | L. | | Nascienzo | Italy | Cava de tirreni a | leaves | used for prep | Medicinal | decoction is | Mautone, M | NA | Yes | Ethnobotany |
| 3741 | Cichorium intybus | L. | | Cicoria | Italy | Cava de tirreni a | aerial parts | cooked in pr | Medicinal | Laxative and | Mautone, M | NA | Yes | Ethnobotany |
| 3742 | Condrilla juncea | L. | | Lattarole | Italy | Cava de tirreni a | aerial parts | cooked in pr | NA | NA | Mautone, M | NA | Yes | Ethnobotany |
| 3743 | Crepis vesicaria | L. | | Lattarole | Italy | Cava de tirreni a | aerial parts | cooked in pr | NA | NA | Mautone, M | NA | Yes | Ethnobotany |
| 3744 | Helminthotheca echioides | (L.) Holub | | Lattarole | Italy | Cava de tirreni a | aerial parts | cooked in pr | NA | NA | Mautone, M | NA | Yes | Ethnobotany |
| 3745 | Reichardia picroides | (L.) Roth | | Lattarole | Italy | Cava de tirreni a | aerial parts | cooked in pr | NA | NA | Mautone, M | NA | Yes | Ethnobotany |
| 3746 | Silybum marianum | (L.) Gaertn | | Cardone | Italy | Cava de tirreni a | flowers | cooked in pr | NA | NA | Mautone, M | NA | Yes | Ethnobotany |
| 3747 | Sonchus oleraceus | (L.) L. | | Stracciacannarone | Italy | Cava de tirreni a | aerial parts | cooked in pr | NA | NA | Mautone, M | NA | Yes | Ethnobotany |
| 3748 | Taraxacum campylodes | G.E. Haglund. | | Cicoria sarvatica | Italy | Cava de tirreni a | leaves | uncooked in | NA | NA | Mautone, M | NA | Yes | Ethnobotany |
| 3749 | Capsella bursa-pastoris | (L.) Medik. | | Zeppolelle sarvatic | Italy | Cava de tirreni a | leaves | cooked in pr | NA | NA | Mautone, M | NA | Yes | Ethnobotany |
| 3750 | Nasturtium officinale | R.Br | | NA | Italy | Cava de tirreni a | leaves | in salads or c | NA | NA | Mautone, M | NA | Yes | Ethnobotany |
| 3751 | Arbutus unedo | L. | | Sovera pelosa | Italy | Cava de tirreni a | fruits | they were ea | Medicinal | decoction of | Mautone, M | NA | Yes | Ethnobotany |
| 3752 | Castanea sativa | Mill. | | Castagno | Italy | Cava de tirreni a | seeds | to prepare ca | NA | NA | Mautone, M | NA | Yes | Ethnobotany |
| 3753 | Mentha x piperita | L. | | Armenta | Italy | Cava de tirreni a | leaves | as a main ing | Medicinal | used in the p | Mautone, M | NA | Yes | Ethnobotany |
| 3754 | Mentha x rotundifolia | (L.) Huds | | Armenta | Italy | Cava de tirreni a | leaves | as a main ing | Medicinal | used in the p | Mautone, M | NA | Yes | Ethnobotany |
| 3755 | Mentha spicata | L. | | Armenta | Italy | Cava de tirreni a | leaves | as a main ing | Medicinal | used in the p | Mautone, M | NA | Yes | Ethnobotany |
| 3756 | Laurus nobilis | L. | | Lauro | Italy | Cava de tirreni a | leaves | used as an ar | Medicinal | used in the p | Mautone, M | NA | Yes | Ethnobotany |
| 3757 | Ceratonia siliqua | L. | | Sciuscella | Italy | Cava de tirreni a | fruits | food for chil | Medicinal | the fresh frui | Mautone, M | NA | Yes | Ethnobotany |
| 3758 | Asparagus acutifolius | L. | | Spalice | Italy | Cava de tirreni a | aerial parts | cooked with | Medicinal | eaten fresh, t | Mautone, M | NA | Yes | Ethnobotany |
| 3759 | Ruscus aculeatus | L. | | Scacciasurece | Italy | Cava de tirreni a | aerial parts | in salads or v | NA | NA | Mautone, M | NA | Yes | Ethnobotany |
| 3760 | Myrtus communis | L. | | Murtella | Italy | Cava de tirreni a | fruits | Used to prep | Medicinal | leaves used t | Mautone, M | NA | Yes | Ethnobotany |
| 3761 | Fraxinus ornus | L. | | Uorn | Italy | Cava de tirreni a | bark | a water mace | Medicinal | laxative, use | Mautone, M | NA | Yes | Ethnobotany |
| 3762 | Plantago lanceolata | L. | | Cincheniervi | Italy | Cava de tirreni a | leaves | cooked in pr | Medicinal | crushed leav | Mautone, M | NA | Yes | Ethnobotany |
| 3763 | Plantago major | L. | | Cincheniervi | Italy | Cava de tirreni a | leaves | cooked in pr | Medicinal | crushed leav | Mautone, M | NA | Yes | Ethnobotany |
| 3764 | Portulaca oleracea | L. | | Pucchiacchella, Er | Italy | Cava de tirreni a | aerial parts | eaten in sala | NA | NA | Mautone, M | NA | Yes | Ethnobotany |


# MedWEP Dataset & analysis

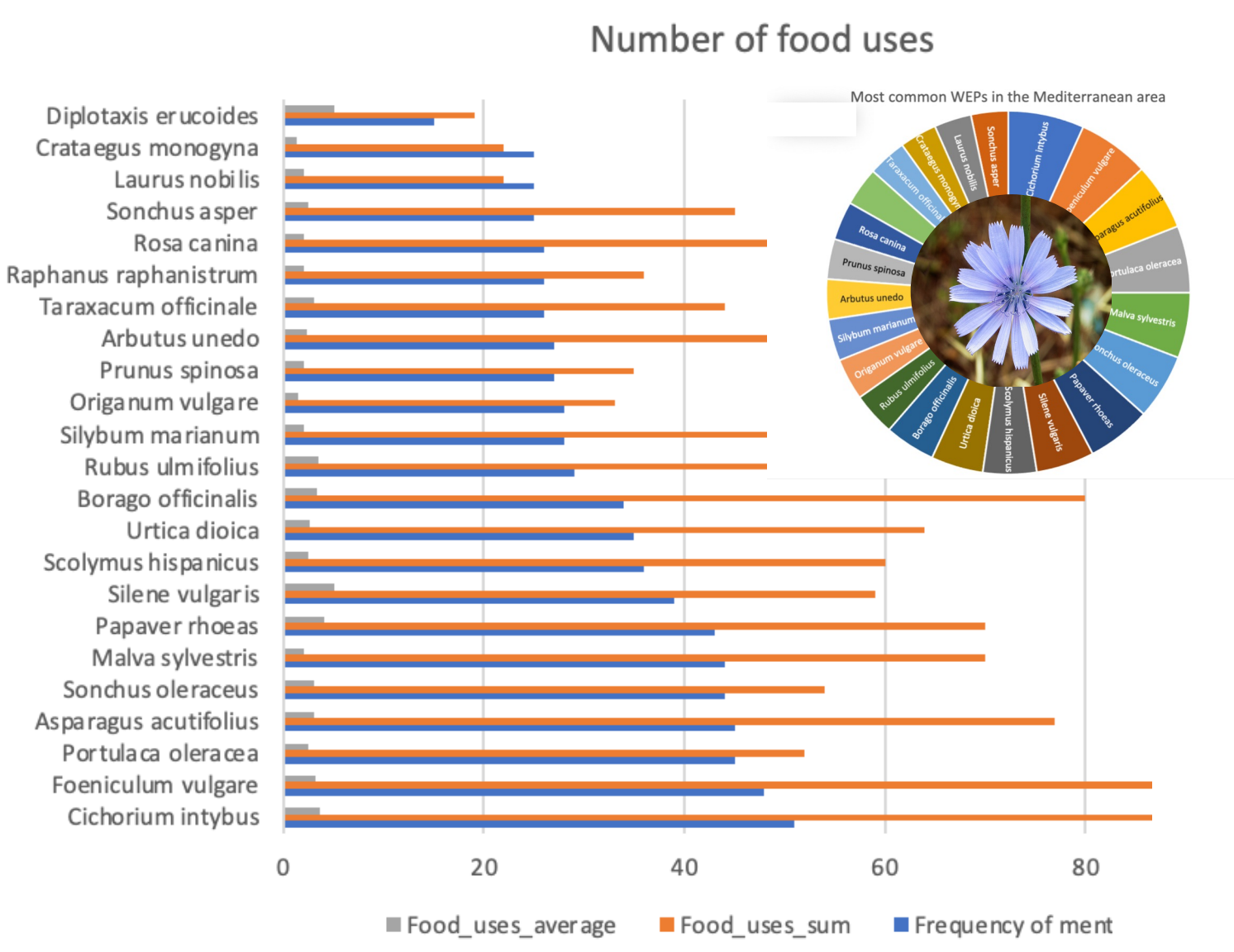
**Taxonomic analysis:** What does WEP diversity in the Mediterranean look like? What are the most species-rich families and genera? – Around 10.000 accessions, 2900 unique species. Richest families: Asteraceae, Lamiaceae, Rosaceae, Fabaceae.

**Ethnobotanical analysis**: What are the most used species (frequency of mention)?; What are the most versatile? What's the overlap between food and medicine?

*Cichorium, Foeniculu, Sonchus, Portulaca, Silene, Urtica.*

# Preliminary results

- Most utilized part of MedWEP are leaves, followed by fruits and aerial parts..
- Countries listing the highest number of studies are Italy, Spain and Turkey. Most significative knowledge gaps come from Egypt, Lybia, e Syria.
- Nearly 40% of all MedWEP can be eaten raw. The restant 60% needs prior cooking.
- 25.5% of species are consumed as beverages (23.5% non-alcoholic, 9.5% alcoholic)
- Nearly 10% of the species is eaten with/in pasta rice dishes
- More than 10% of the species is eaten with eggs or in omelettes



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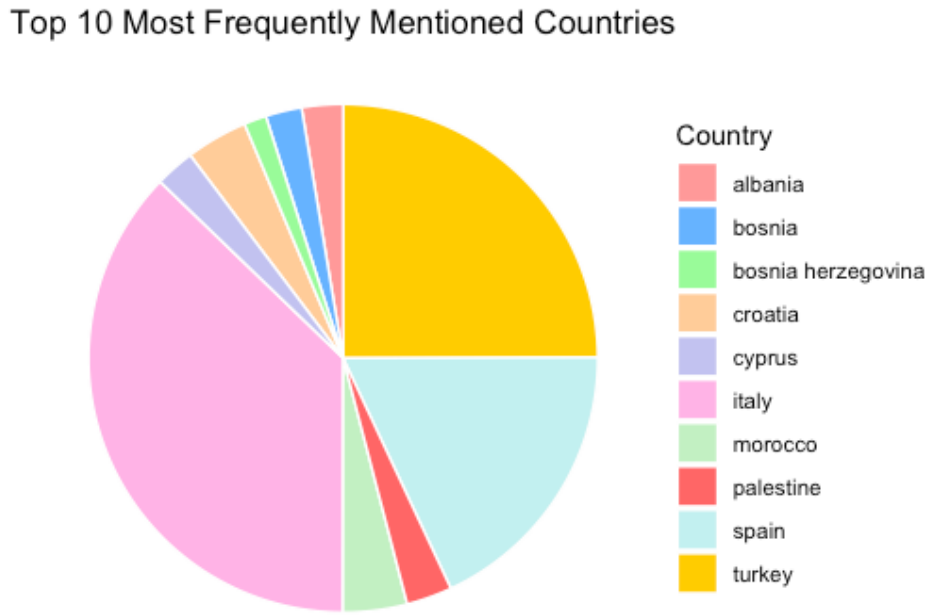
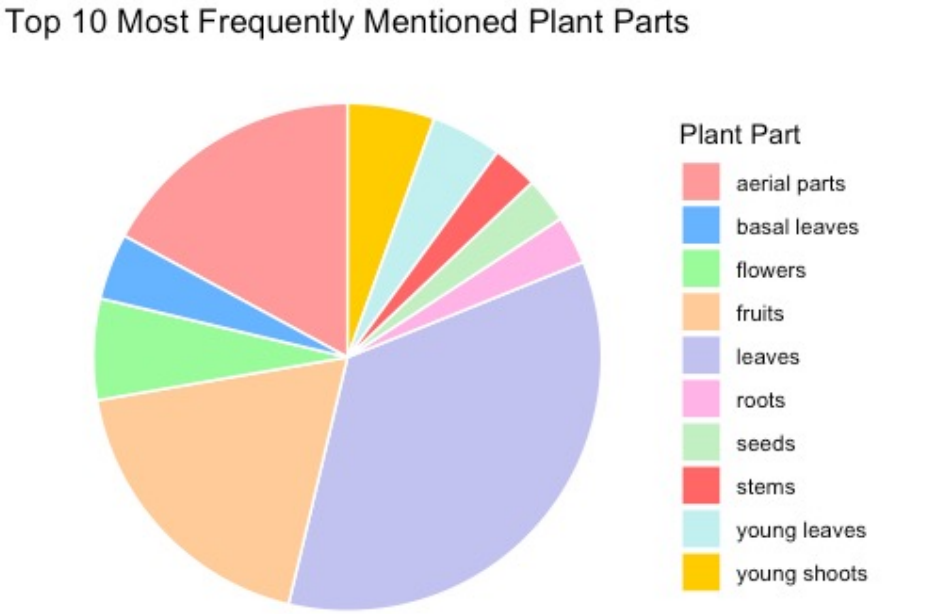


# Restoring the traditional Mediterranean diet through the conservation of wild edible plants

Promoting the sustainable use of the traditional Eastern Mediterranean diet, through the preservation of traditional knowledge and science-based conservation of wild edible plants in Jordan and Lebanon.

## Impact & Collaboration

Plant Growth Regulation (2022) 97:175–184
https://doi.org/10.1007/s10725-021-00717-5

ORIGINAL PAPER

**Physiological and environmental control of seed germination timing in Mediterranean mountain populations of *Gundelia tournefortii***

Efisio Mattana[1] · Pablo Gómez-Barreiro[2] · Nizar Youssef Hani[3] · Khaled Abulaila[4] · Tiziana Ulian[1]

RIBES

MILLENNIUM SEED BANK PARTNERSHIP

Kew

Genmeda

NETWORK OF MEDITERRANEAN PLANT CONSERVATION CENTRES

# Next steps:

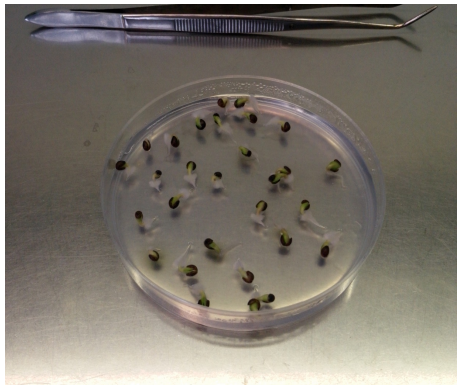
- Creation of heatmaps highlighting the distribution of Mediterranean WEPs across countries and bioregions, highligring food biodiversity hotspots

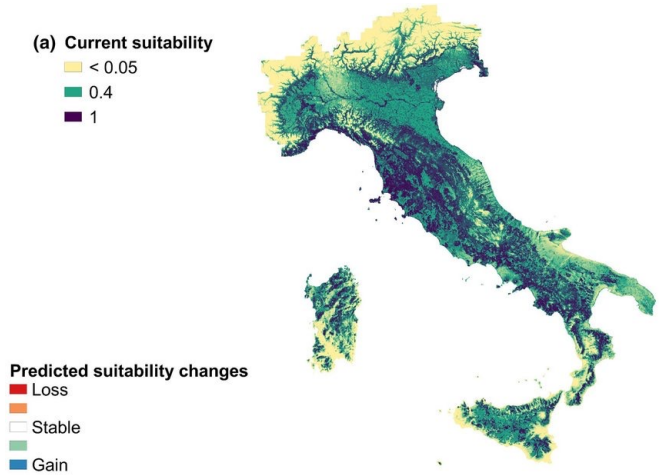
Phase II

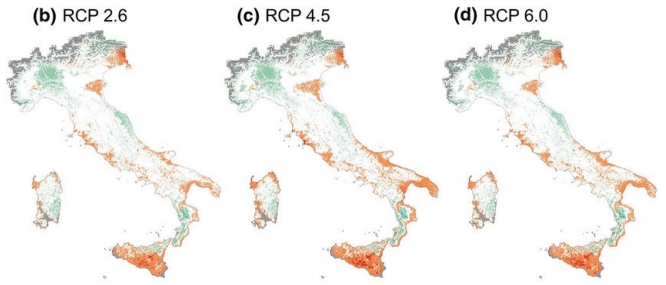
- Selection of priority species based on socio-environmental attributes and initiation of fieldwork.
- Development of interviews, fieldwork, and production of ethnobotanical inventories in the Sulcis-Iglesiente and Central Barbagia subregions of Sardinia.

PhaseI II

- Modeling the current and future distributions of priority species in Sardinia based on climate change scenarios using the optimal temperature germination ranges for seeds (MaxEnt).






RESEARCH ARTICLE

Plants People Planet PPP

**Regeneration from seeds in a temperate native flora: A climate-smart and natural–capital-driven germination risk modelling approach**

Efisio Mattana[1] | Ted Chapman[1] | Stephanie Miles[1] | Tiziana Ulian[1] | Angelino Carta[2,3]

*plants* MDPI

*Article*

**Potential Distribution of *Cedrela odorata* L. in Mexico according to Its Optimal Thermal Range for Seed Germination under Different Climate Change Scenarios**

Salvador Sampayo-Maldonado [1], Cesar A. Ordoñez-Salanueva [1], Efisio Mattana [2], Michael Way [2], Elena Castillo-Lorenzo [2], Patricia D. Dávila-Aranda [3], Rafael Lira-Saade [3], Oswaldo Téllez-Valdés [3], Norma I. Rodríguez-Arévalo [3], Cesar M. Flores-Ortiz [1,4,*] and Tiziana Ulian [2]

# To sum up

- **Towards resilient food systems:** Wild edible plants are crucial for building resilient food systems, offering innovative solutions to environmental and food security challenges, reinforcing the importance of conservation.
- **Interdisciplinary research:** Merging taxonomy, ethnobotany, and seed ecology provides holistic insights crucial for effective conservation and sustainable utilization. The integration of ethnobotany fosters a more inclusive and sustainable approach.
- **Data:** First comprehensive dataset on Mediterranean wild edible plants, significant impact for understanding edible plant biodiversity and cultural significance.

# Thank you for your attention

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