



Project ReCROP - Bioinocula and CROPPing systems: a biotechnological approach for improving crop yield, biodiversity and REsilience of Mediterranean agro- ecosystems

Sofia Pereira (UCP)

sapereira@ucp.pt

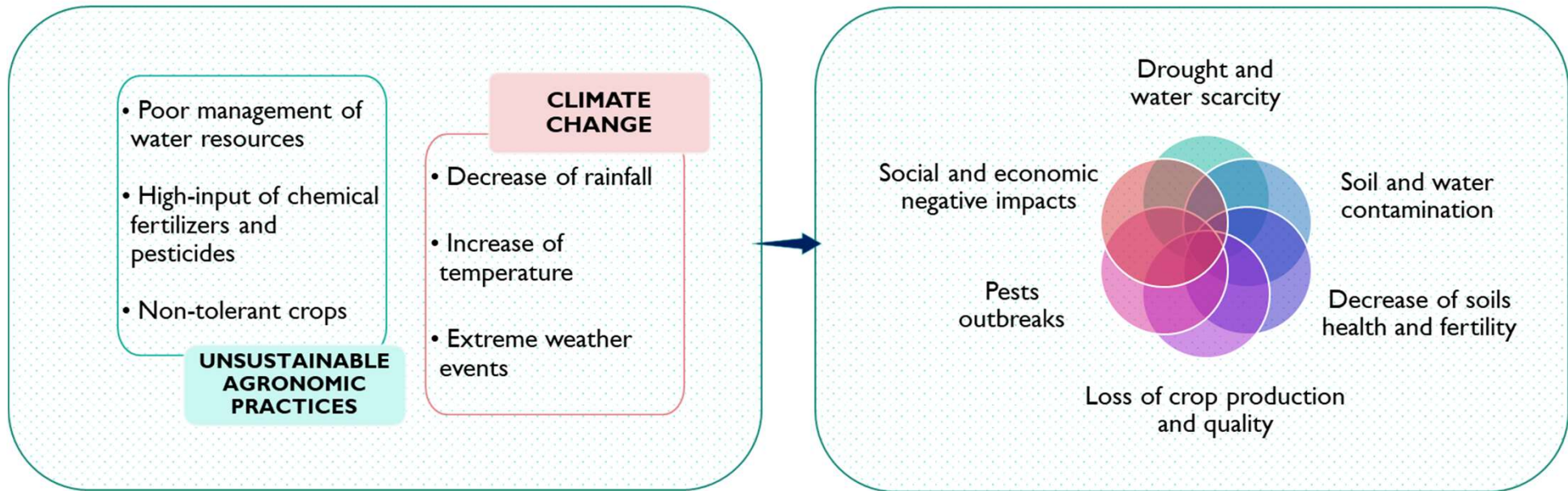
PRIMA
Section 2 Call 2020 - Multi-topic
Topic 2.2.1 (RIA) Re-design the agro-livelihood systems to ensure resilience

Co-funded by:



The basis for ReCROP project

CHALLENGE: Improve the sustainability and resilience of Mediterranean farming systems



...fostering sustainability and resilience of agricultural production systems (...) combined use of biotechnological tools, such as bioinoculants (mycorrhiza-MF and plant growth-promoting bacteria-PGPB), and environmentally friendly agronomic practices.

ReCROP consortium



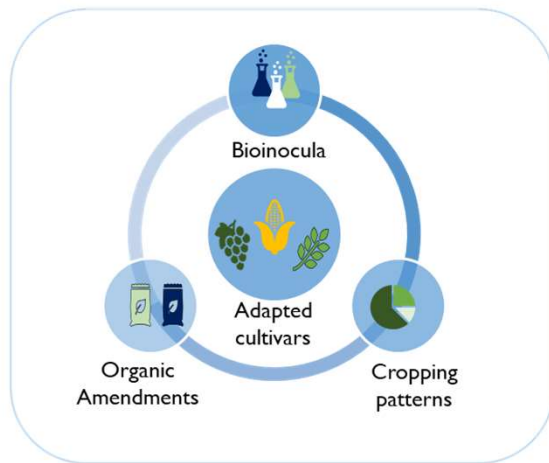
7 countries:

Portugal, Spain, France,
Italy, Morocco, Egypt,
Tunisia

II Partners:

- ESB-UCP, Portugal
- IDARN, Portugal
- ADVID, Portugal
- NEIKER, Spain
- CSIC, Spain
- UPVM-CEFE , France
- UM-CEE-M , France
- IRET-CNR , Italy
- FSTG, Morocco
- FOAFU, Egypt
- INAT, Tunisia

ReCROP Strategy



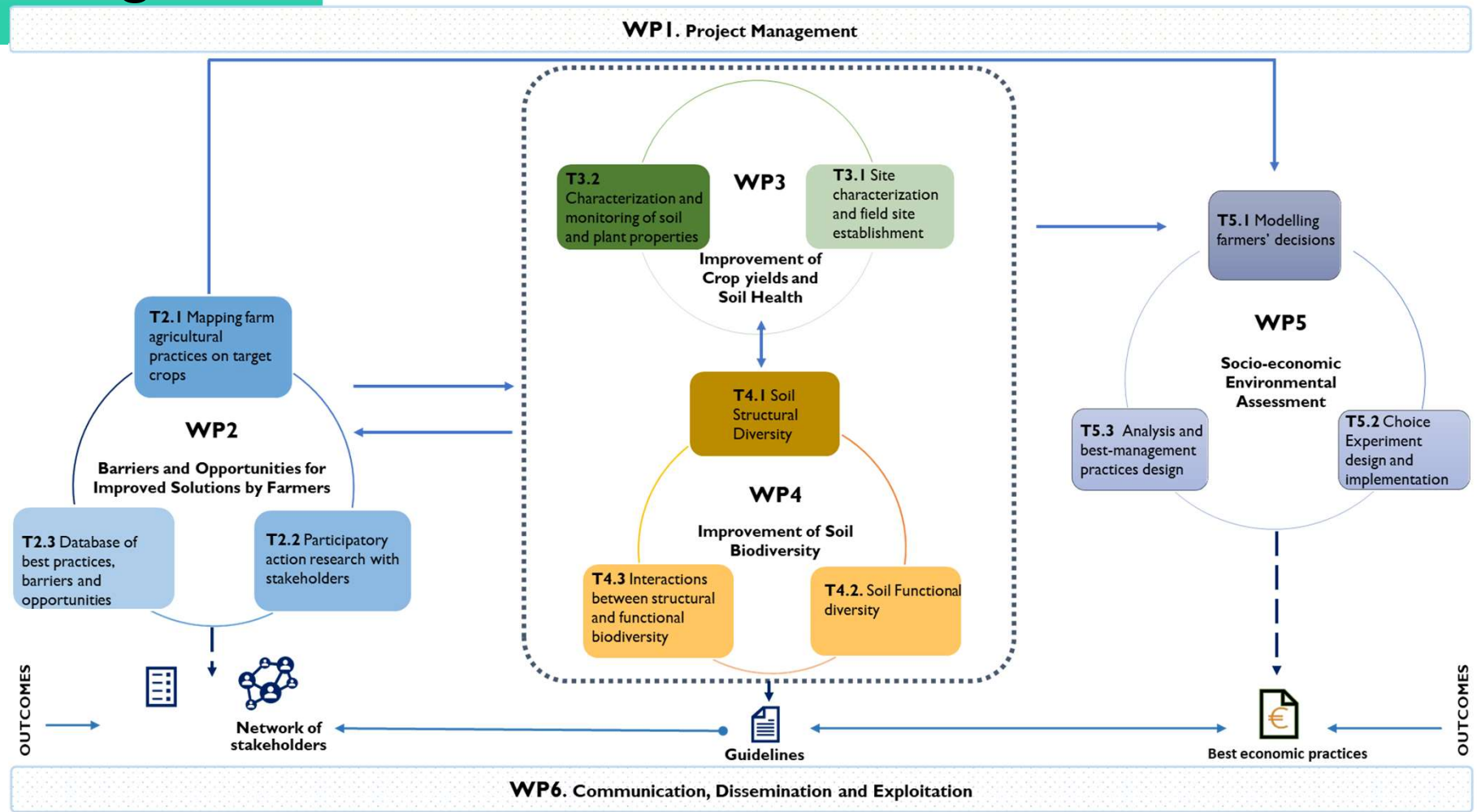
- **The established and newly set-up field sites** in each country are being used to study the beneficial effects of cropping systems, bioinoculation, and amendments in 3 important Mediterranean crops - **vineyards, maize** and **aromatic/medicinal** plants



A **multi-actor approach** is being implemented to:

- identify barriers and opportunities related to technical and socioeconomic aspects (close proximity to farmers to incorporate local knowledge).
- design optimal adoption routes
- identify solutions to increase crop production in a sustainable way while ensuring farmer's incomes

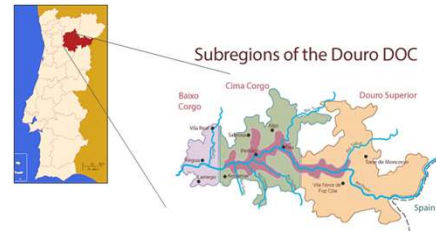
Work packages



Established sites

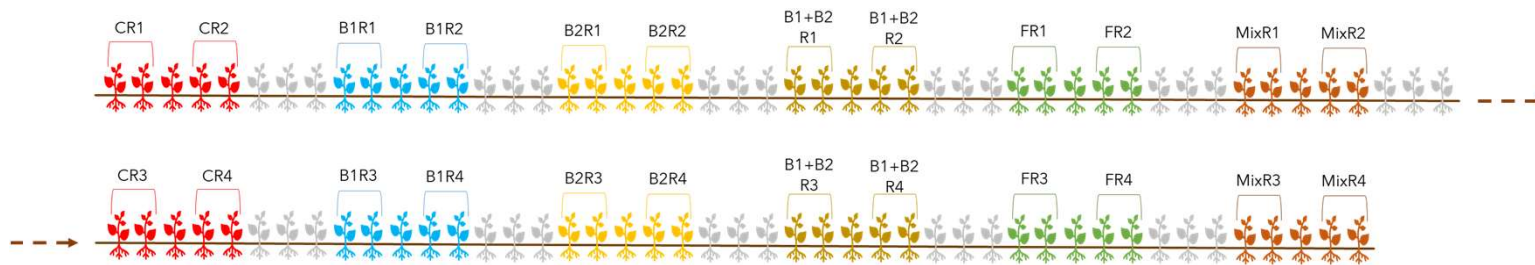


Douro - Portugal



Microbial inoculation:

- Control (without inoculation)
- PGPR 1 – *Pseudomonas fluorescens*
- PGPR 2 - *Arthrobacter nicotivorans*
- PGPR 1 + PGPR 2
- Fungi (AMF) – INOQ Agri; Germa
- MIX (PGPR 1, PGPR 2, AMF)

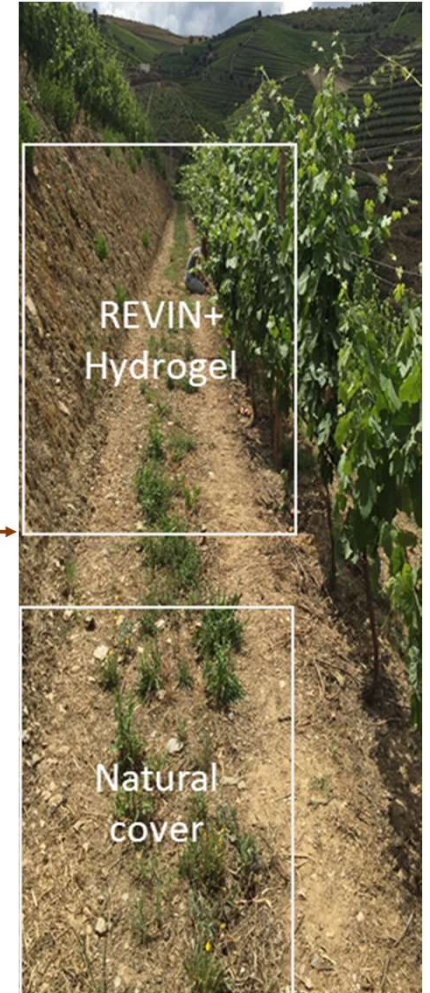
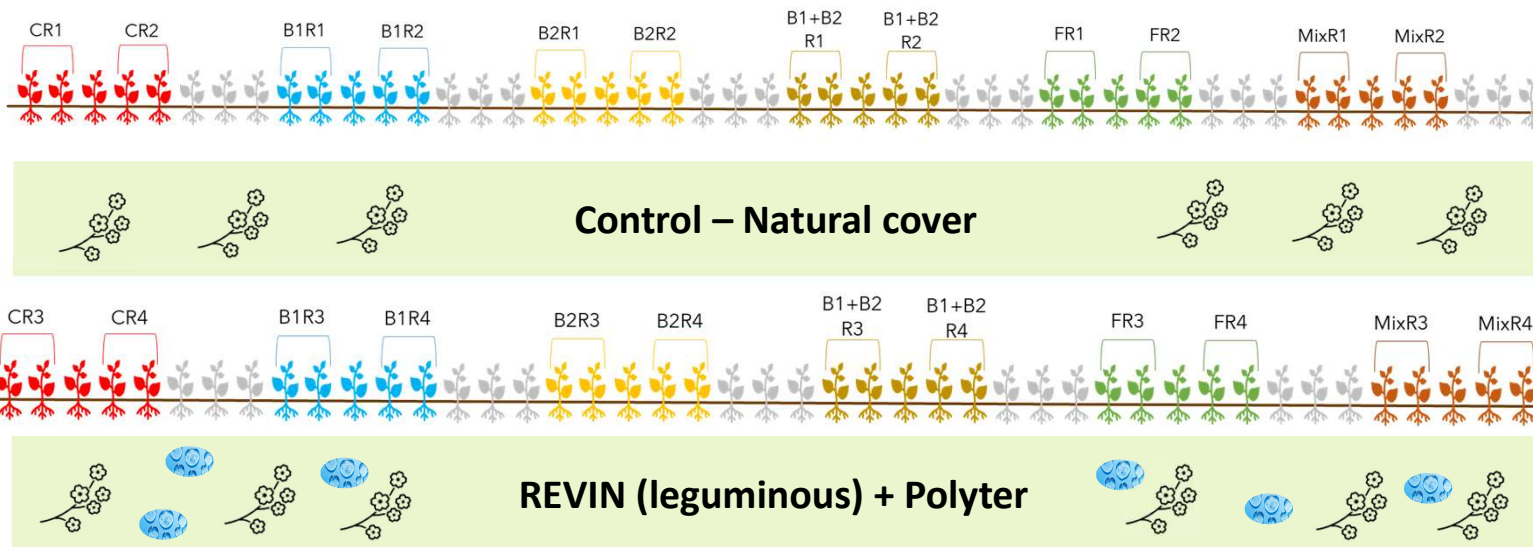


Vineyards

Douro - Portugal

Establishment of cover crops in the interrows – Nov 2022

- For each inoculation treatment (x2):
 - C - Control – natural cover
 - T1 – REVIN (leguminous) + hydrogel



Vineyards

Pont du Gard - France



- Natural cover crop all year vs control
- Natural cover crop in winter vs control
- Cover crop in winter (sowing after the grape harvest) vs control
- Compost vs control



Portugal

New site

- Established in April 2023
- Harvest in September 2023

The practices implemented:

- ryegrass during the winter
- application and incorporation of cow slurry before maize sowing
- application of bioinoculants containing plant growth promoting bacteria and mycorrhizal fungi after maize sowing
- N fertilization reduced by 25%

Treatments (x3 plots – 8 rows x 50 m):

- T1 – Control
- T2 – Mineral fertilization (100%)
- T3 – Bioinoculants
- T4 – Mineral fertilization (100%) + bioinoculants
- T5 - Mineral fertilization (75%)
- T6 - Mineral fertilization (75%) + bioinoculants



Maize

Field trial establishment

Fertilizer application and sowing



Land preparation



After 2 weeks...

Inoculation



Maize

Harvest



Maize



- Fresh and dry biomass
- Yield
- Macro and micronutrients
- Digestibility of fibers
- Nutritive content

SPAIN

Organic vs Conventional



Cultivation of maize after ryegrass prairie (3-5 years) vs Cultivation of maize after turnip (*Brassica rapa*) grown during autumn-winter and incorporated in spring as green manure

Fayoum - Egypt

Experimental Farm of the Faculty of Agriculture, Fayoum University, Southeast Fayoum Governorate

Intercropping



Biochar



- Intercropping (Maize/Cowpea) vs Control (Maize)
- Composted biochar and/or Biochar vs Control under deficit irrigation
- Bioinoculation vs Control under deficit irrigation
- Antioxidant foliar application vs Control under deficit irrigation

TRIP - Tunisia

Coriandrum sativum

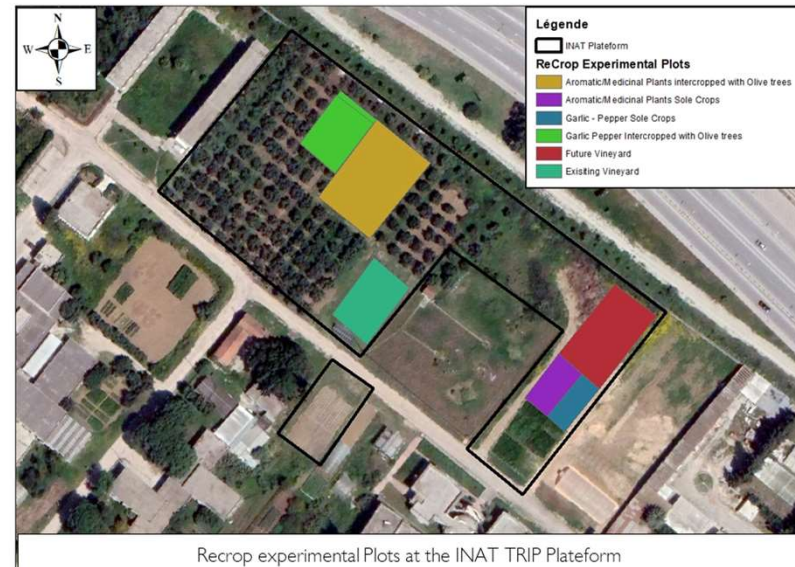
Foeniculum vulgare

Pimpinella anisum

Allium sativum

Capsicum annuum

Aromatic/medicinal plants



- Sole cropping of Aromatic-medicinal plants
- Intercropping Aromatic-medicinal crops with legumes
- Intercropping Aromatic-medicinal crops with olive trees
- Intercropping Aromatic-medicinal crops with legumes and Olive trees

TRIP - Tunisia

Aromatic/medicinal plants



Aromatic and Medicinal Plants intercropped with Olive Trees installation.



Coriander plot intercropped with Olive Trees.



Caraway sole intercropped with olive trees



Anise and Beans plot in sole cropping system



Coriander plot intercropped with olive trees



Caraway sole Plot intercropped with Olive Trees



Coriander and Beans plot intercropped with Olive Trees



ReCROP - Bioinocula and CROPPing systems: an integrated biotechnological approach for improving crop yield, biodiversity and REsilience of Mediterranean agro-ecosystems

ReCROP UCP Team

- Sofia Pereira
- Paula Castro
- João Cortez
- Eduardo Cardoso



Coordinator



PRIMA

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National Funding Agencies



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