



Midas

MARGINAL LANDS, INDUSTRIAL CROPS
AND INNOVATIVE BIO-BASED VALUE CHAIN

Innovative cropping systems for industrial crops on marginal lands facing natural constraints

Date: 8/10/25

Andrea Monti¹, Federica Zanetti¹, Alexandro Ferreira¹, Efthymia Alexopoulou²

¹UNIBO, ²CRES



*This project has received funding from the European Union's Horizon Europe
Research and Innovation Programme under Grant Agreement No. 101082070.*



**ΚΑΠΕ
CRES**

Midas aim

- 
- MIDAS aims to grow, evaluate and valorize sustainable low-ILUC industrial feedstock by developing selected industrial crops and cropping systems on European marginal agricultural land in a climate-resilient and biodiversity-friendly way to support feasible bio-based value chains.

**Midas
builds on
two
pillars:**

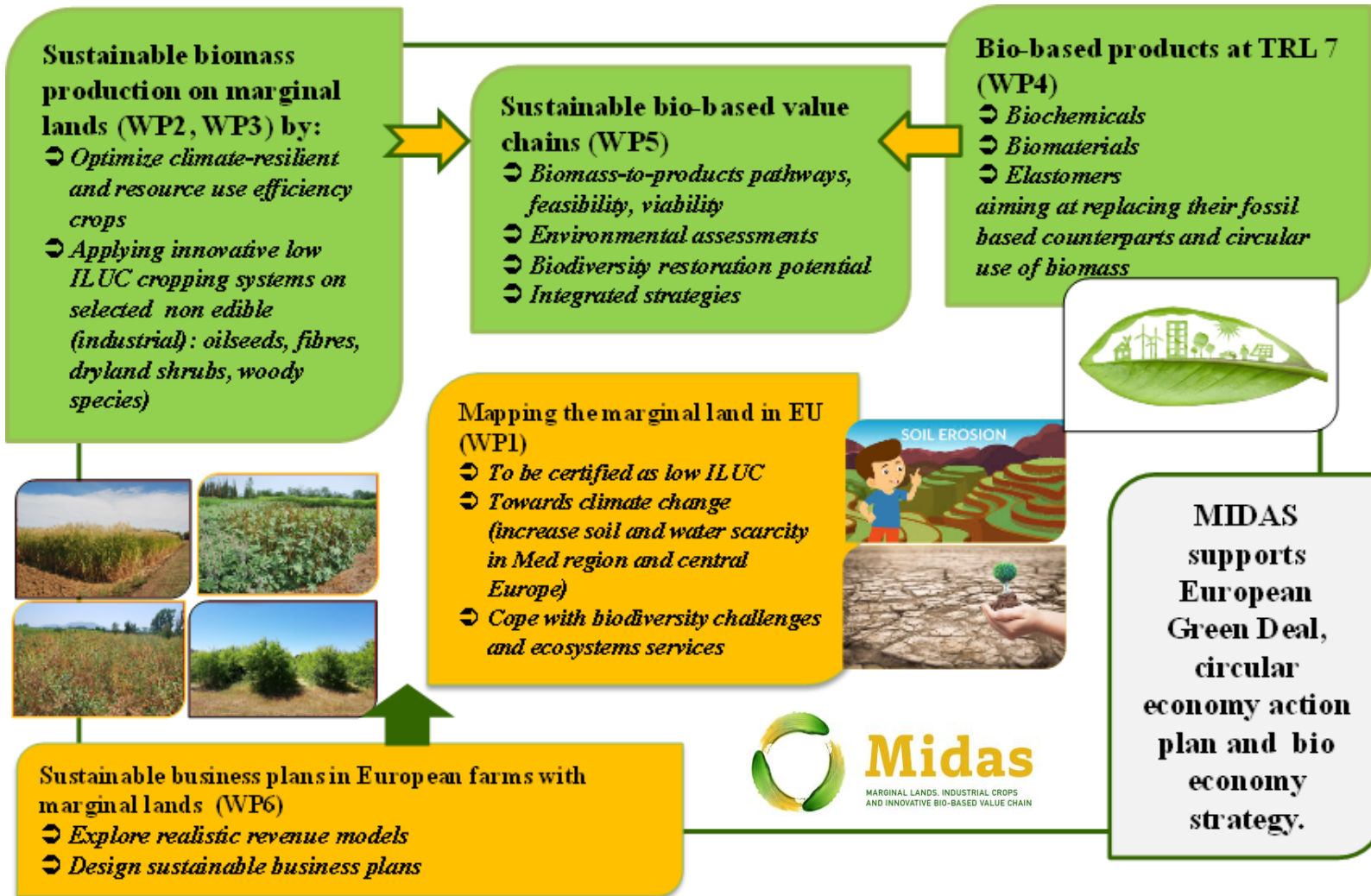


To optimize selected climate-resilient and biodiversity-friendly industrial crops and cropping systems able to tolerate water scarcity and mitigate desertification, while improving biodiversity conservation, particularly in Mediterranean and central European Member States; the optimization will be two-fold through breeding and agronomy



To improve the functional performance of specific value chains and products, taking into account an improved resource use efficiency so as to boost the sustainable use of non-edible industrial biomass in a bio refinery concept

Midas at a glance

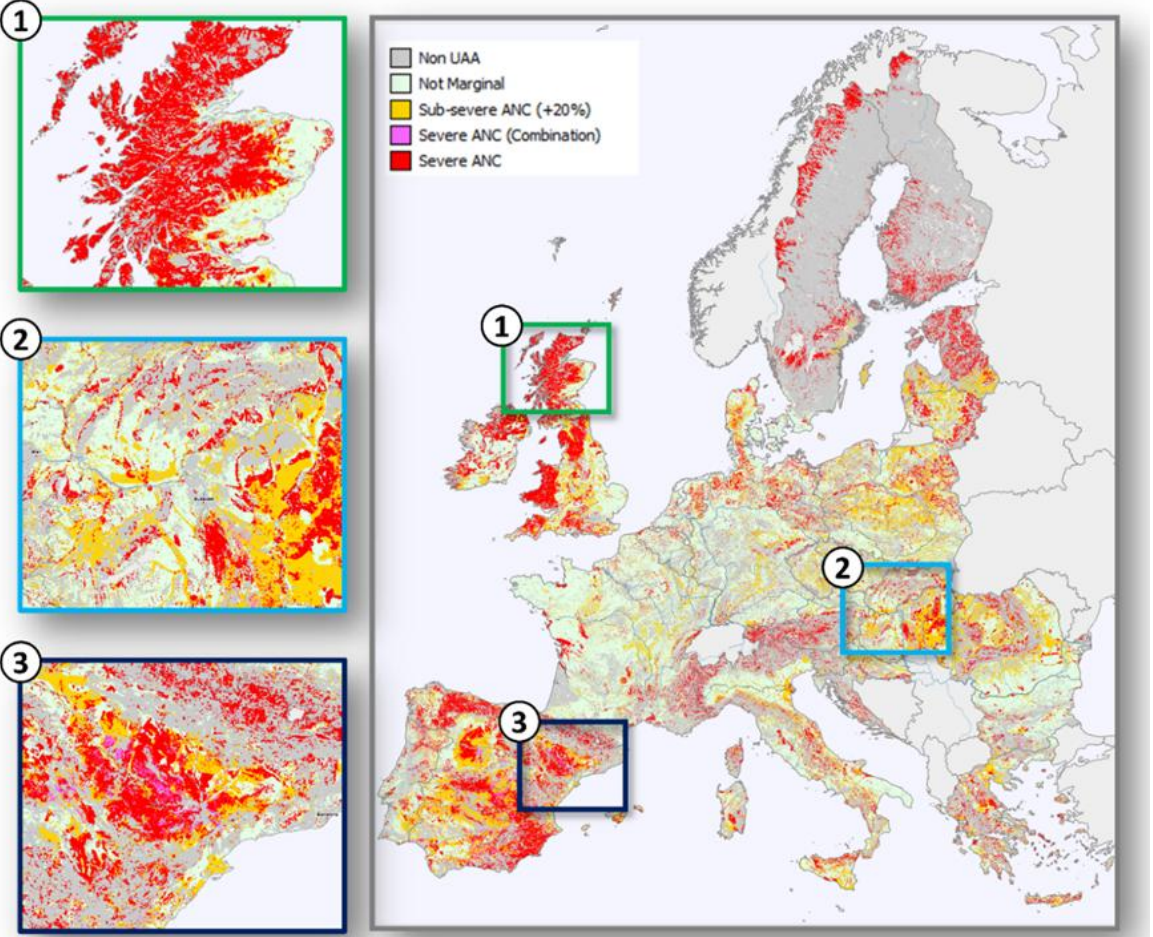


Midas will:

- Map and characterize marginal lands for low-ILUC feedstock in the context of current and future expectations on soil erosion, water stress and ecosystem services conditions in Central and South Europe.
- Develop innovative low-ILUC cropping systems on marginal lands (intercropping /agroforestry) in 9 countries and 13 sites at TRL 7.
- Develop 11 innovative bio-based products at TRL 7 following a circular use of biomass.
- Develop 3 innovative sustainable (profitable, low-ILUC, carbon-negative, biodiversity enhancing) value chains and webs.
- Deliver sustainable business plans that ensure overall business case viability as well as improved farm socio-economic resilience
- Engage a multi-actor group (for co-creation) consisting of: farmers' representatives, bio-based industries, research community and civil society.

- Build on European cooperation (12 EU countries plus Serbia) and international cooperation (Brazil and Canada) to exchange the best practices and to boost win-win scenarios.

Mapping of low-ILUC lands (builds on MAGIC work)



Midas will map and characterize marginal lands for low-ILUC feedstock in the context of current and future expectations on soil erosion, water stress and ecosystem services conditions in Central and South Europe.

In total 29% of the agricultural area is marginal in EU-27 & UK.

The most common are rooting limitations (12% of agricultural area after correction for improvement), adverse climate and excessive soil moisture (11% and 8% of the agricultural land).

The largest share of marginal lands is defined by one of the six clustered limitations, while in a much smaller share multiple limitations occur.

	1. Adverse climate	2. Excessive soil moisture	3. Adverse chemical comp.	4. Low soil fertility	5. Adverse rooting cond.	6. Adverse terrain	Marginal	Not marginal
Alpine	40%	21%	0%	2%	45%	47%	61%	39%
Atlantic	4%	14%	1%	1%	12%	5%	26%	74%
Continental	1%	5%	2%	1%	5%	2%	14%	86%
Mediterranean	13%	1%	1%	6%	18%	9%	34%	66%
North	62%	14%	0%	3%	13%	3%	71%	29%
Grand Total	11%	8%	1%	2%	12%	6%	29%	71%

Innovative cropping systems for industrial crops on marginal lands facing natural constraints



Midas
MARGINAL LANDS, INDUSTRIAL CROPS
AND INNOVATIVE BIO-BASED VALUE CHAIN

**Midas
cropping
systems**

To optimize selected industrial crops adapted to marginal lands through modern biotechnology tools and tailored agronomic practices towards low ILUC cropping systems

To develop case studies of low-ILUC cropping systems (intercropping & agroforestry) on marginal agricultural land on farm level for present and future farming systems



Intercropping and agroforestry



Midas

MARGINAL LANDS, INDUSTRIAL CROPS
AND INNOVATIVE BIO-BASED VALUE CHAIN

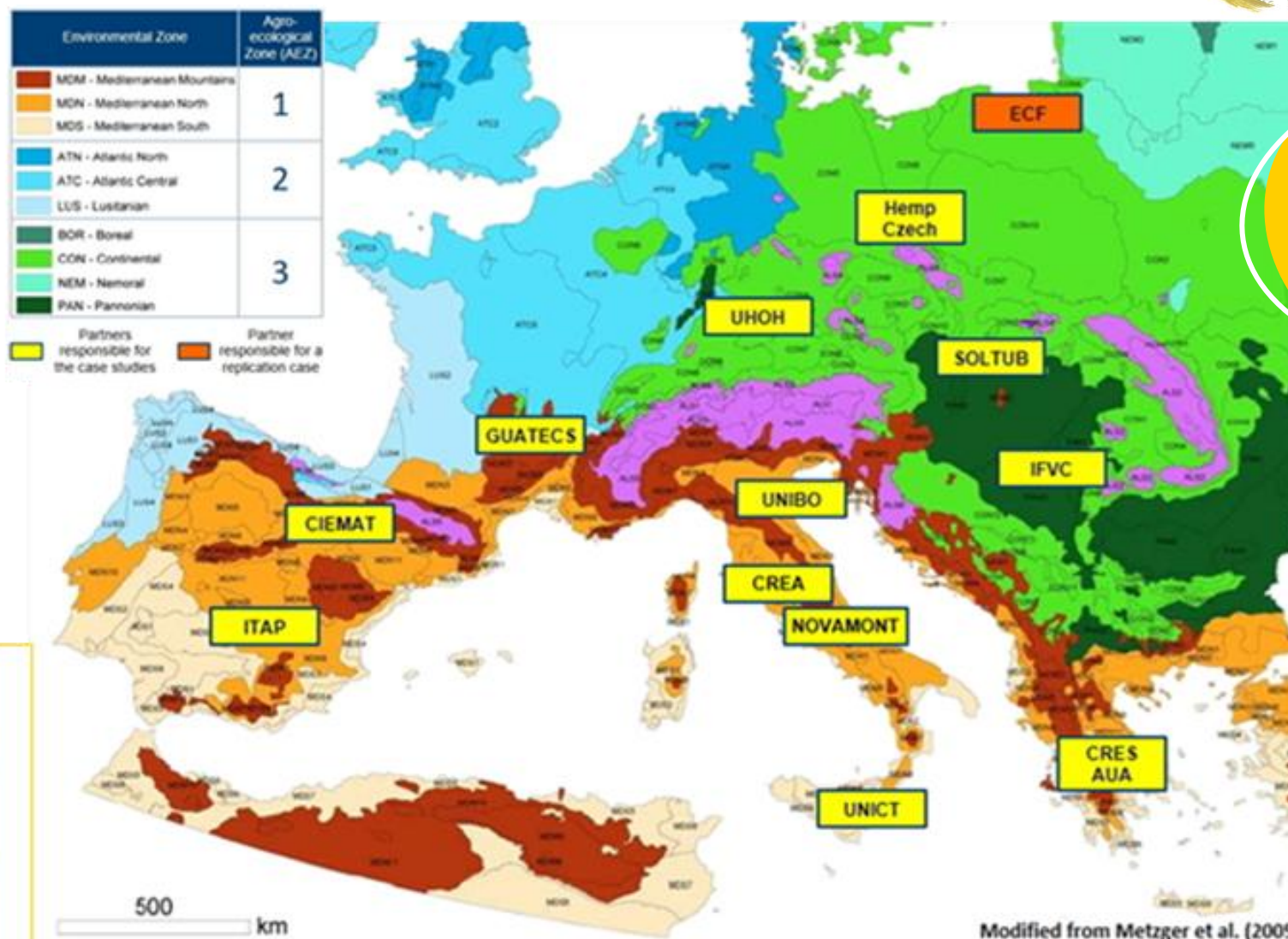
Intercropping:

UNIBO (IT)
UNICT (IT)
NOVAMONT (IT)
CIEMAT (ES)
ITAP (ES)
CRES/AUA (GR)
GUATECS (FR) UHOH (DE)
IFCV (SE)
HEMPCZECH (CZ)

Agroforestry:

CIEMAT (ES)
CRES/AUA (GR) CREA (IT)
SOLTUB (HU)
ECF (PL)

Sites of the field case studies; 16 in total. In the case of CRES/AUA (GR), SOLTUB (HU) & CIEMAT (ES) two field case study have been set up.

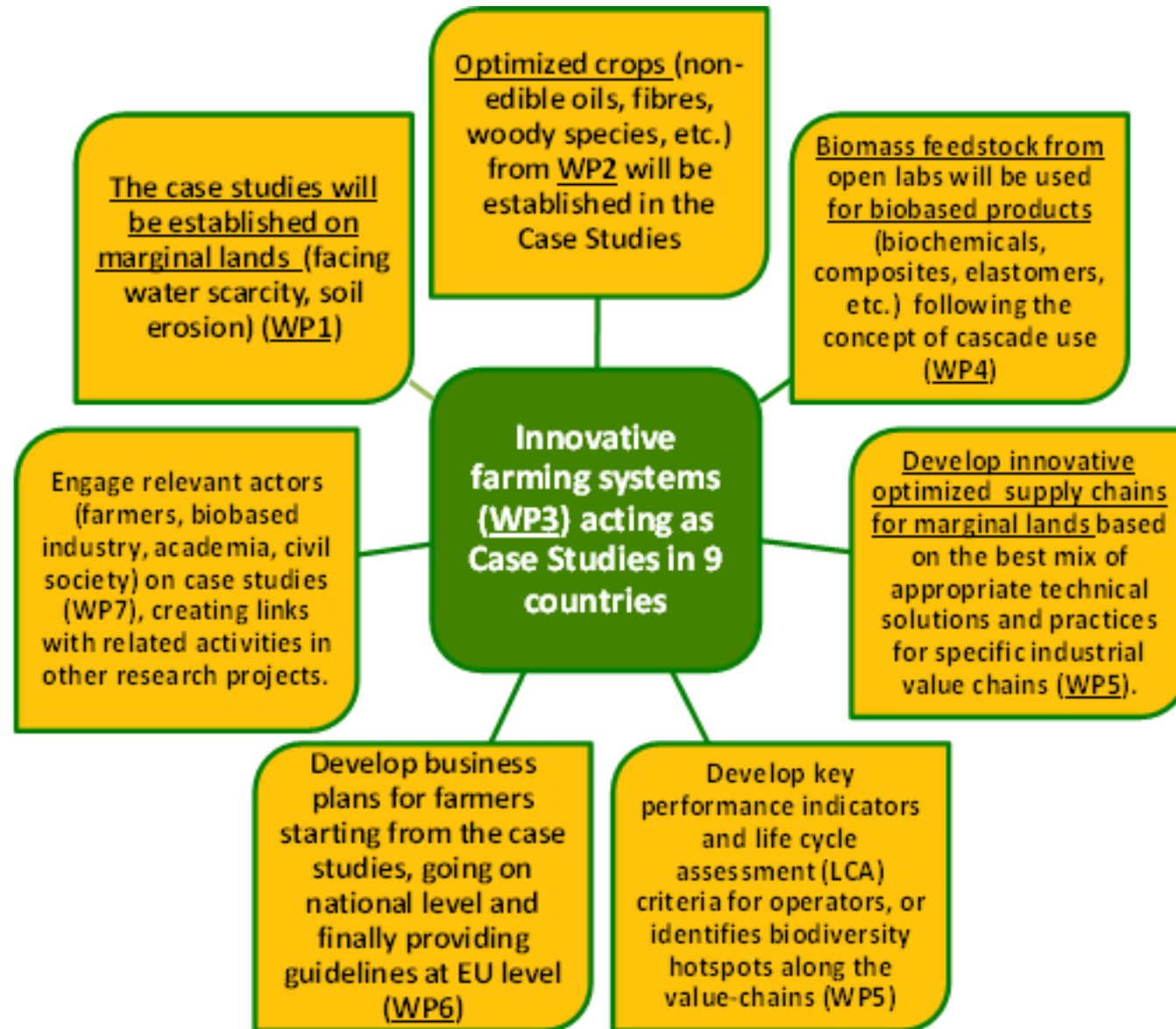


16 case studies in 9 European countries

Innovative farming systems acting as case studies in 9 countries will have a central role in Midas (connected with all WPs)

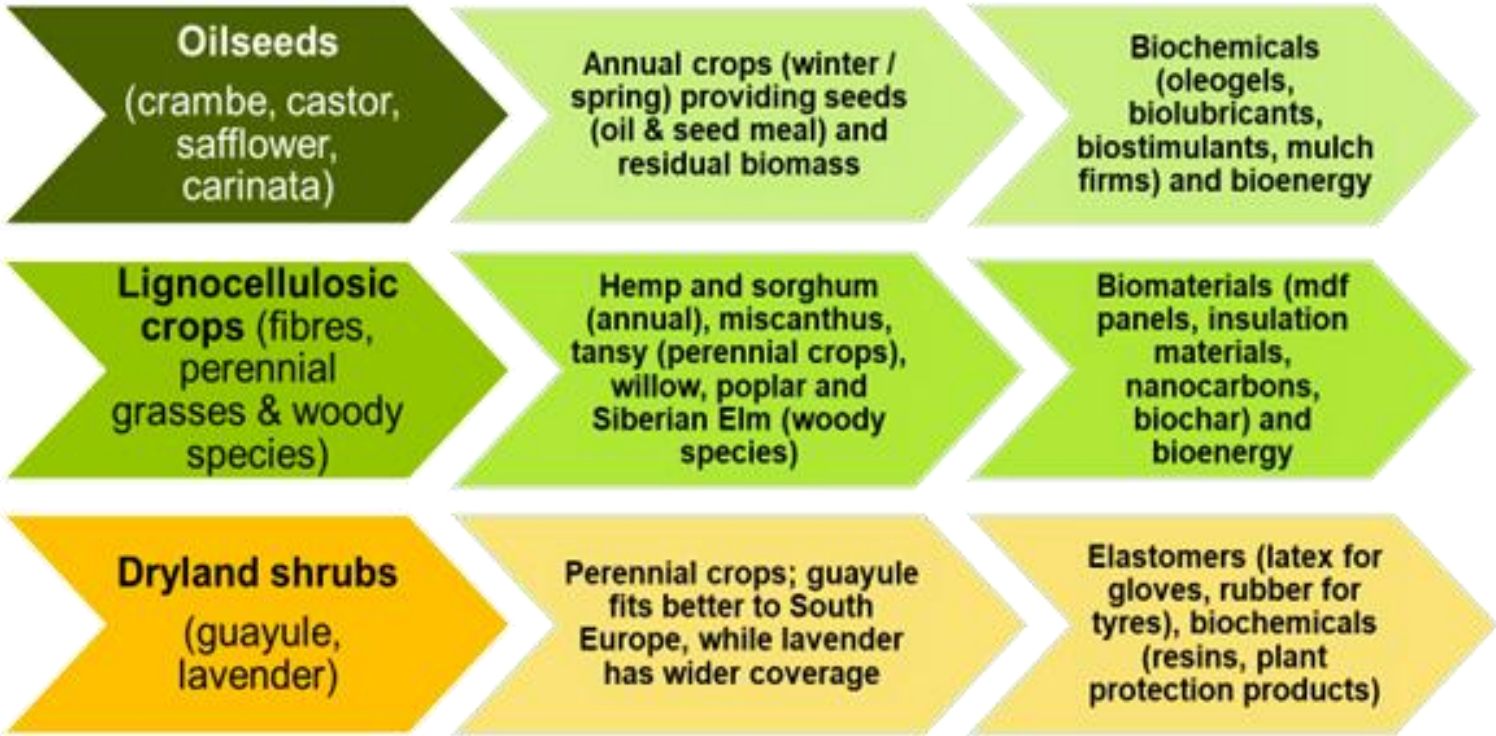


Midas
MARGINAL LANDS, INDUSTRIAL CROPS
AND INNOVATIVE BIO-BASED VALUE CHAIN



- ➔ Two types of cropping systems (12 intercropping and 5 agroforestry) in 9 countries and in 13 sites in total.
- ➔ RAGs organized in 9 countries for co-creation of knowledge and planning with relevant stakeholders (mainly farmers).

Non-edible crops for MIDAS and uses



Oilseeds
(crambe,
carinata,
castor)



Lignocellulosic
(woody crops,
perennial
grasses,
hemp, etc.)



Dryland shrubs
(Guayule)

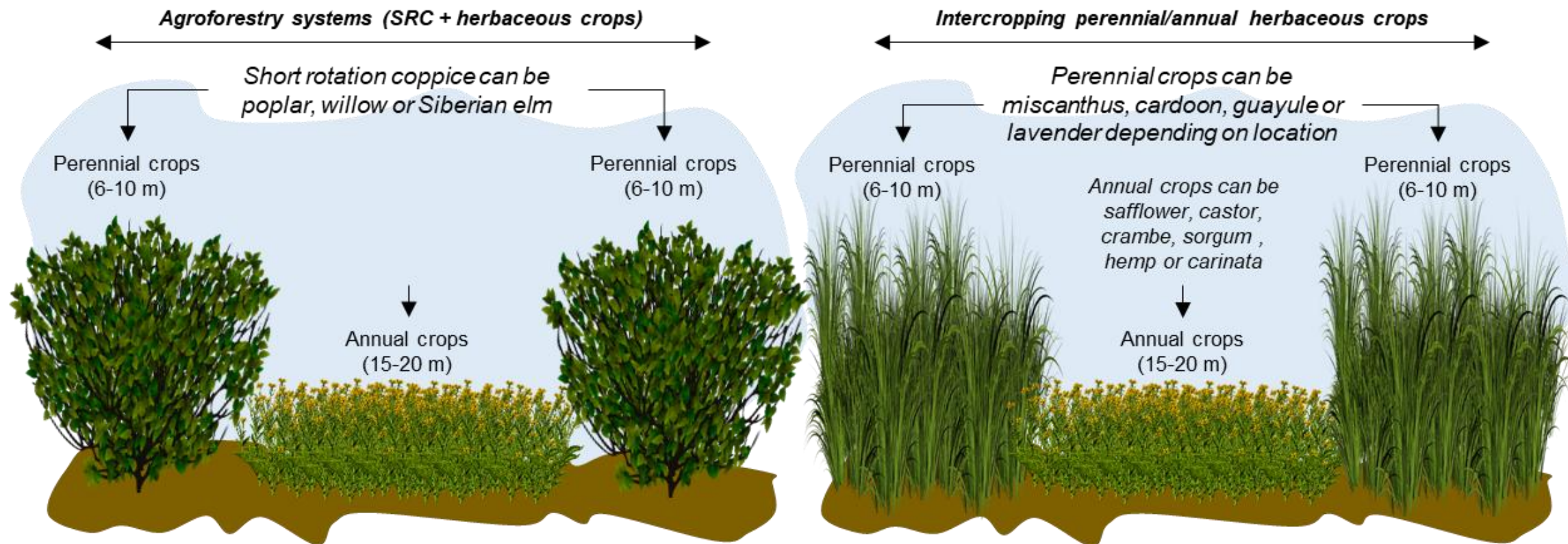


Innovative Cropping Systems (intercropping & agroforestry)



Midas

MARGINAL LANDS, INDUSTRIAL CROPS
AND INNOVATIVE BIO-BASED VALUE CHAIN



Nine case studies will be developed where the Midas innovative cropping systems will be evaluated; Each case study will be connected with a Regional Advisory Board consisting mainly from practitioners.

Intercropping trials including miscanthus as perennial crop (6 case studies)



Midas
MARGINAL LANDS, INDUSTRIAL CROPS
AND INNOVATIVE BIO-BASED VALUE CHAIN



**UNIBO: near Bologna (IT);
annual crops crambe,
safflower & hemp**



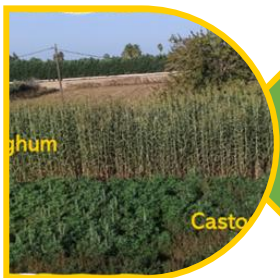
**Czech point: near Prague
(CZ); annual crops hemp,
safflower & sorghum**



**UHOH; near Stuttgart (DE);
melilot, crambe and hemp**



**Hungary: near Budapest
(HU); hemp, sorghum,
carinata**



**CRES & AUA: near Pyrgos
(sorghum, castor bean and
safflower)**



**IFCV: near Novisad (SR);
crambe, safflower, sorghum**

Intercropping trials including cardoon as perennial crop (2 case studies, both in Italy)



Midas
MARGINAL LANDS, INDUSTRIAL CROPS
AND INNOVATIVE BIO-BASED VALUE CHAIN



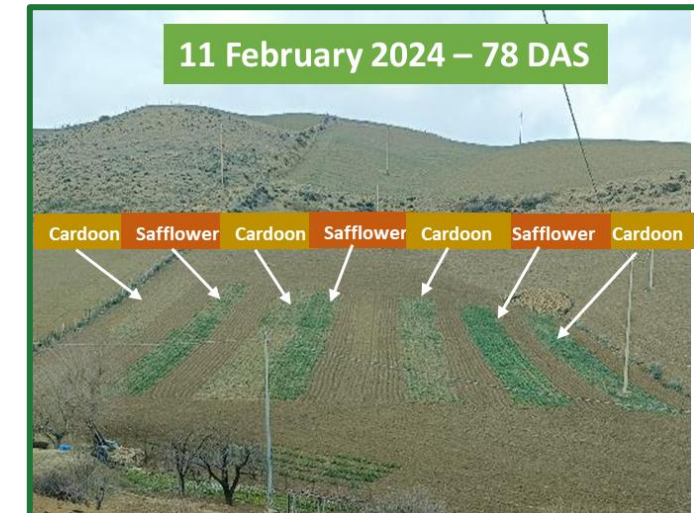
Novamont, Umbria/Italy (2 sites with total size 6 ha)

- Perennial crop: cardoon
- Annual: Castor bean and safflower



UNICT, Catania/Italy (0.5 ha)

- Perennial crop: cardoon
- Annual crops: safflower, castor bean and industrial hemp



Intercropping trials including guayule as perennial crop (2 case studies, Spain and France)



Midas
MARGINAL LANDS, INDUSTRIAL CROPS
AND INNOVATIVE BIO-BASED VALUE CHAIN



ITAP, Castilla la Mancha/Spain

- Perennial crop: guayule
- Annual: safflower and industrial hemp



Guatecs, Montpellier/France

- Perennial crop: guayule
- Annual crops: safflower and industrial hemp

Intercropping trials including lavender as perennial crop (2 case studies, Spain and Greece)



Midas
MARGINAL LANDS, INDUSTRIAL CROPS
AND INNOVATIVE BIO-BASED VALUE CHAIN



CIEMAT, Soria/Spain

- Perennial crop: lavender
- Annual: crambe, safflower and melilotus



CRES, Chalkidiki/Greece

- Perennial crop: lavender
- Annual crops: safflower and crambe



Agroforestry trials including poplar or Siberian Elm as perennial crop (5 case studies, Poland, Hungary, Italy, Spain and Greece)



CREA: near Rome (IT); poplar with crambe and safflower



ECF: north PL; poplar with a mixture of perennial grasses (meadow fescue, timothy and bromus)



CRES & AUA: Chalkidiki (GR); poplar with crambe and safflower



SOLTUB: poplar with 3 annual: sorghum, carinata and hemp



Midas
MARGINAL LANDS, INDUSTRIAL CROPS
AND INNOVATIVE BIO-BASED VALUE CHAIN

One case study was set up by Ciemat in Soria/Spain where Siberian Elm was established with crambe, safflower and melilotus.



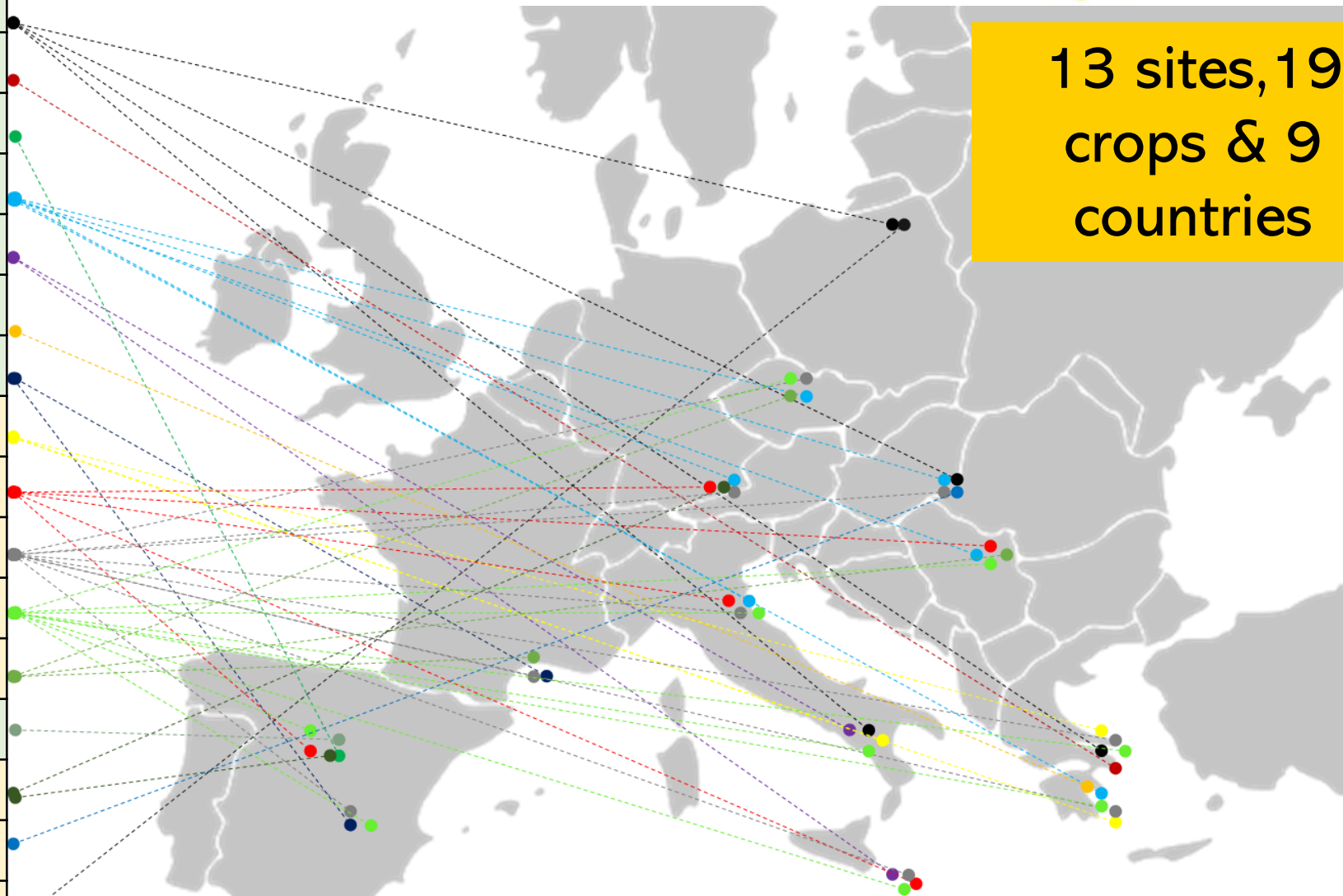


Midas

MARGINAL LANDS, INDUSTRIAL CROPS
AND INNOVATIVE BIO-BASED VALUE CHAIN

Crop	Sites
Poplar	4
Paulonia	1
Siberian helm	1
Miscanthus	6
Cardoon	2
Switchgrass	1
Guayule	2
Castor	4
Crambe	5
Hemp	9
Safflower	10
Sorghum	3
Lavander	1
Melilotus	2
Carinata	1
Choksfoot, M. fescue, Timothy, bromus	1

13 sites, 19
crops & 9
countries



Midas case studies

- We are in the 3rd year of field case studies and at the end of this year we will have a full data set of field data (including the rotation of the annual crops) and its yields for the perennial crops (grasses and shrubs) will be reported.
- The yields of the annual crops had some reductions compared to the reported ones on typical agricultural areas and the reduction was connected to the marginality problem.
- In some case studies, establishing miscanthus and switchgrass has presented significant challenges, mainly due to marginal soil conditions and weed competition.
- In each case study a farmers group has been built having a consulting role.
- Poplar and guayule showed a better adaptability to marginal conditions, while lavender demonstrated satisfactory biomass production, although its establishment required careful management in drier locations.

The facilitators of the case studies



Midas

MARGINAL LANDS, INDUSTRIAL CROPS
AND INNOVATIVE BIO-BASED VALUE CHAIN



KAPE
CRES



UNIVERSITY OF
HOHENHEIM



SOLTUB



Thank you for your attention, Efi Alexopoulou, eaalex@cres.gr