Italy: Crop diversification experiences

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Diverfarming project

DIVERFARMING Project: Crop diversification and low-input farming across Europe: from practitioners' engagement and ecosystems services to increased revenues and value chain organisation

DIVERFARMING

OBJECTIVE: Encourage the adoption of crop diversification (rotations, intercropping, etc.) under low-input practices in European farms to increase land productivity and crops quality.

25 PARTNERS in 6 European Countries

Duration: 60 months

http://www.diverfarming.eu/index.php/en/

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15 Case studies and
8 Long term experiments

FINLAND

BARLEY + Ryegrass
BARLEY + Rapeseed
BARLEY + Clovergrass, ley, vetch, oat
BARLEY + clovergrass, rye, oats

NETHERLANDS

FODDER + Maize and beans

HUNGARY

ASPARAGUS + Peas
ASPARAGUS + Oat
VINEYARD + yarrow and *Achillea Millefolium* for pharmacy
VINEYARD + native grass for fodder
VINEYARD + cover crops in the alleys

GERMANY

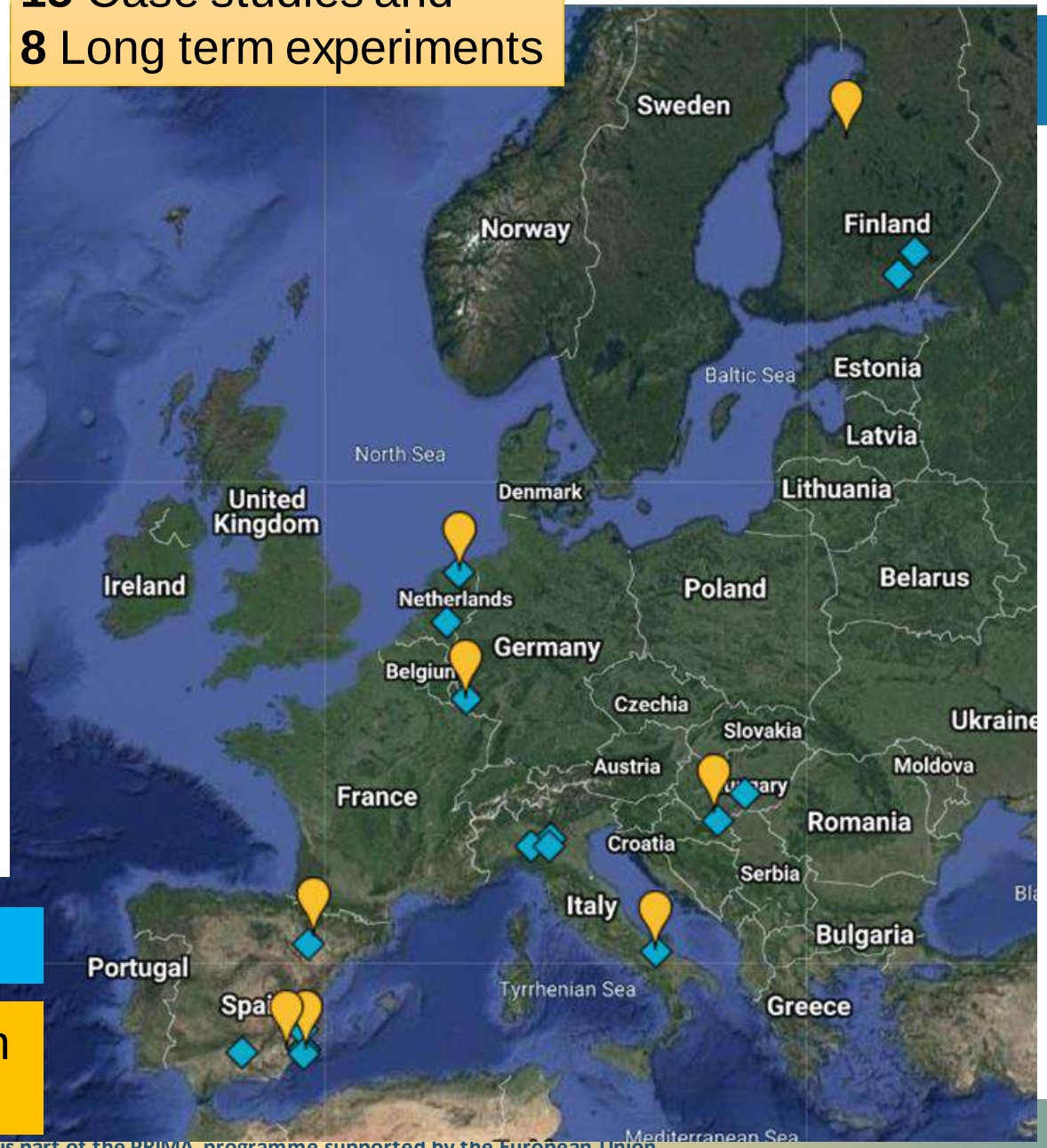
VINEYARD + Oregano
VINEYARD + Thyme

SPAIN

ALMONDS + Caper
ALMONDS + Thyme
MANDARIN + Vetch/barley and fava bean
MANDARIN + Campion, pursiane and cardoon
MANDARIN + Cowpea and rocket
RAINFED WHEAT + Barly, vetch
IRRIGATED MAIZE + Barely or pea
OLIVES + Oats or vetch
OLIVES + Saffron crocus
OLIVES + Lavender

ITALY

WHEAT AND TOMATO ROTATION + Pea
WHEAT AND TOMATO ROTATION + Wheat, tick bean
WHEAT AND TOMATO ROTATION + Rotation tomato, wheat, tick bean with crop residues incorporation



Case studies in blue

Long term experiments in yellow

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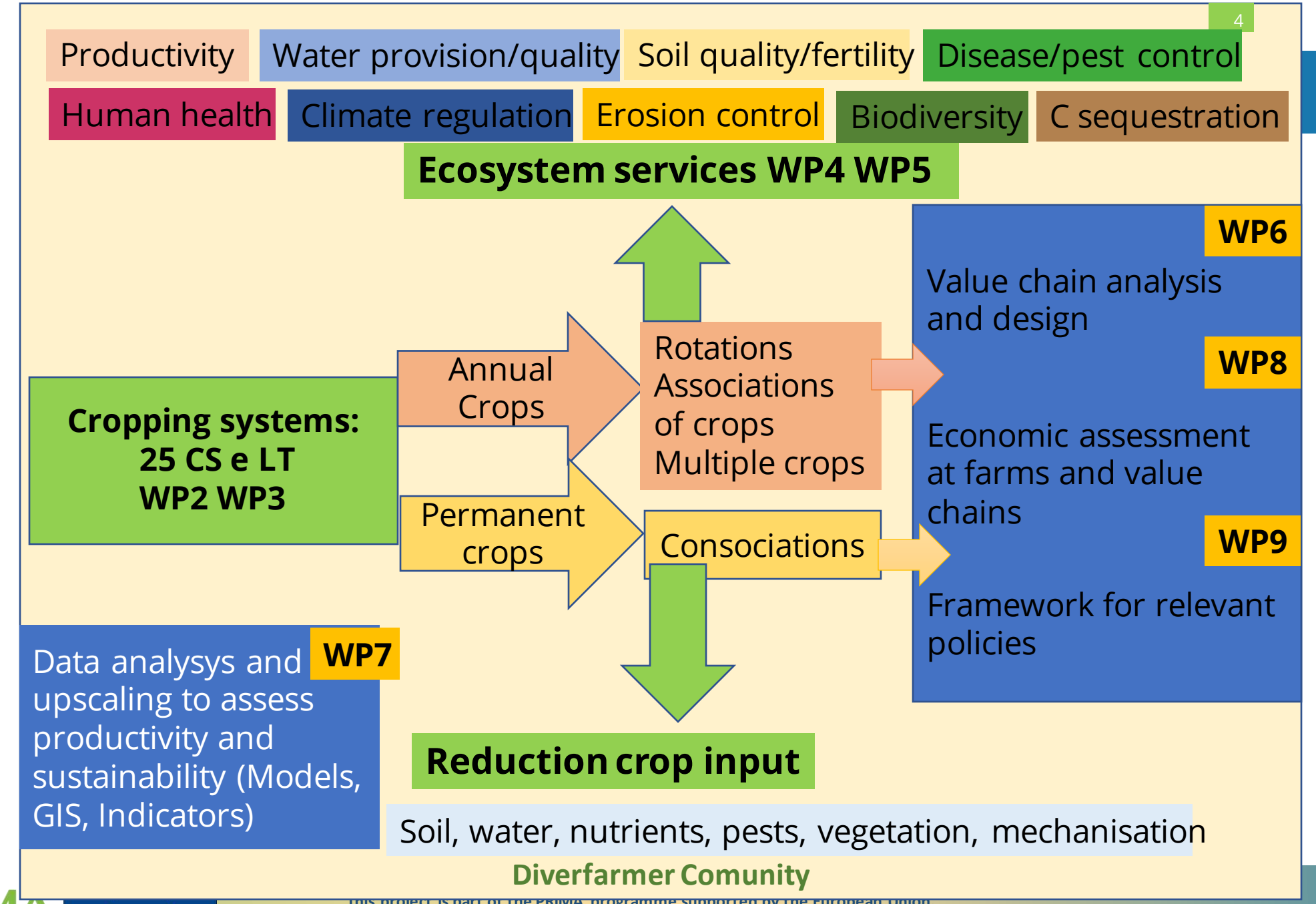

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Innovation approach of DIVERFARMING

- ✓ To test under real conditions (in real farms) new solutions of crop diversification, as rotations, multicropping, intercropping, and reduction of inputs tailored on farm needs.
- ✓ To quantify the eco-systems services of the proposed solutions compared to those in use.
- ✓ To define new supply chain paths that enhance diversified systems.
- ✓ To use biophysical and economic models to estimate the long-term effects of proposed innovations
- ✓ To design a decision support tool for key actors to define the best practices under specific operating conditions (APP SUSDIVER).

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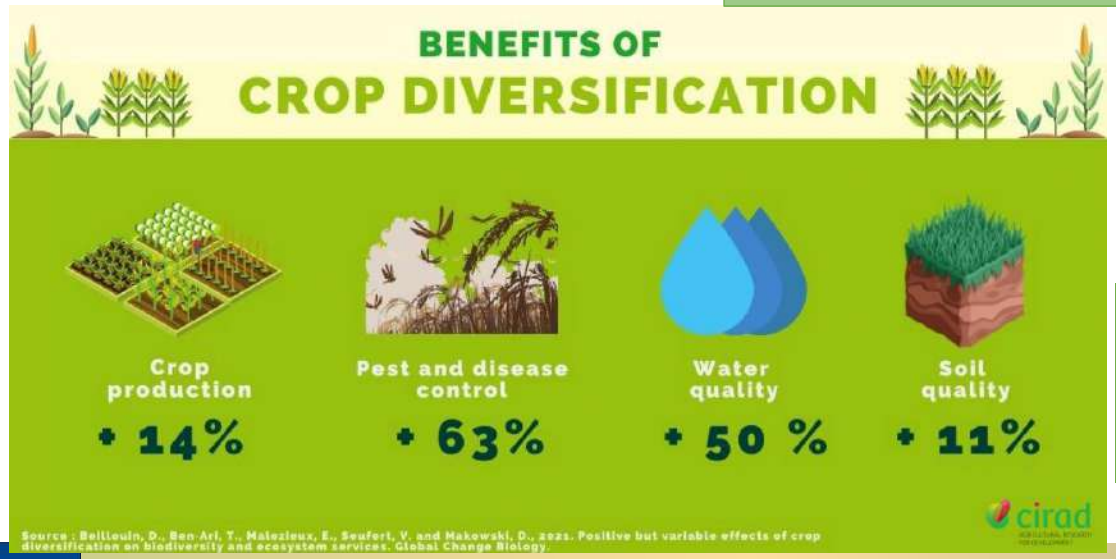
Crop diversification= SUSTAINABLE AGRICULTURE

INTERCROPPING: crops growing in same time

CROP ROTATION

MULTIPLE CROPPING: crops growing in different times

AGROFORESTRY



Basic Glossary: http://www.diverfarming.eu/index.php/en/diverfarmingpractices-2/repository-4

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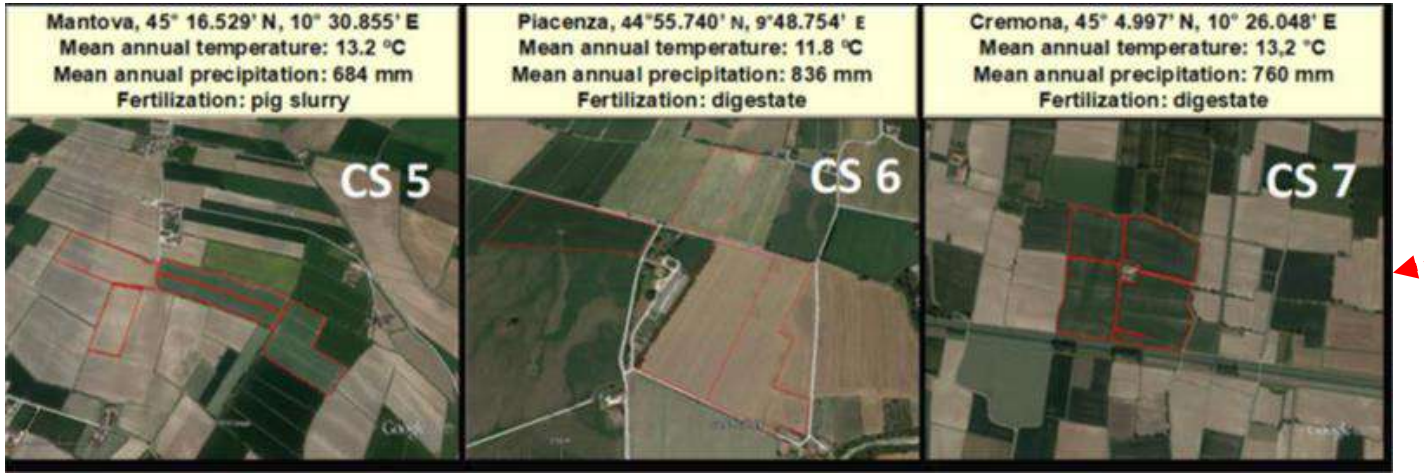
Intensive arable cropping system in Italy

- Pedoclimatic region: Mediterranean North
- Country: Italy
- Location: Po Valley – Mantova, Cremona and Piacenza Province
- Mean annual precipitation: 767 mm
- Mean annual temperature: 14.1 ºC
- Annual ETo: 890 mm



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Experimental context and main environmental problems

- Landscape simplification
- Intensive and specialized cropping systems, mostly oriented on cereals and industrial crops in monoculture or short rotations

- Low soil biodiversity
- Low soil organic matter content
- Soil compaction
- Nitrate leaching and water pollution
- GHG emission
- Risk of water flooding in winter/spring and water scarcity in summer

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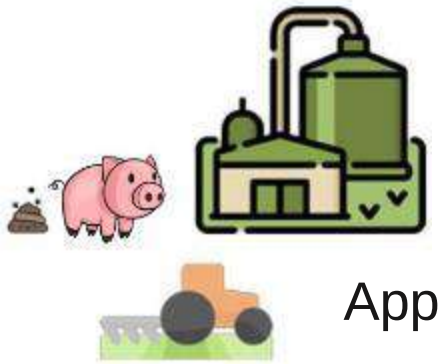
Crop diversification and low-input strategies

Intensive system

Maize monocropping or durum wheat – tomato rotation, with uncovered soil period between crop cycles

Pea-Tomato multiple cropping



Application of digestate or pig slurry in combination with chemical fertilizers

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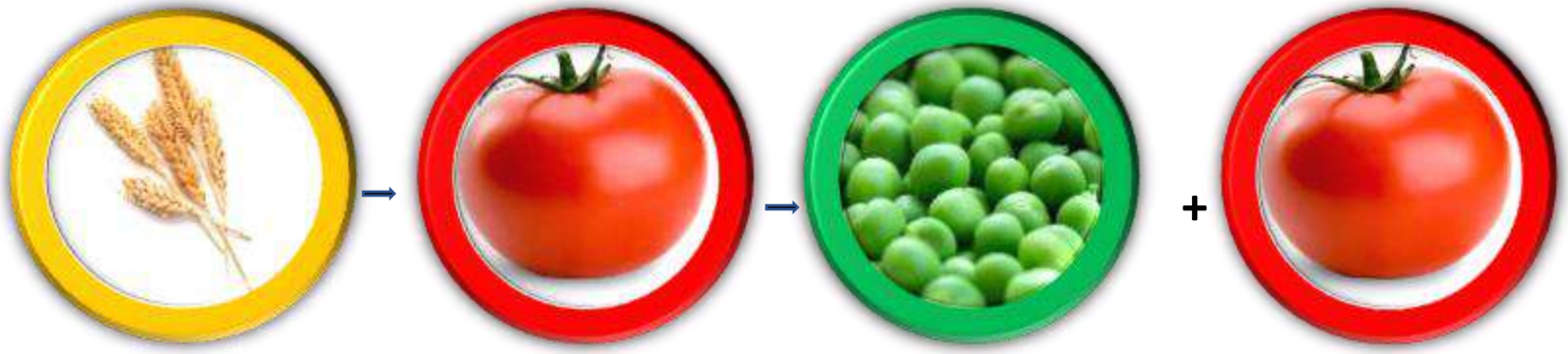
Crop diversification and low-input strategies

ROTATION of 3 YEARS with 4 CROPS

+

COVER CROP of mixed barley/faba bean



Winter wheat
S: mid-late November,
H: max early July

Processing tomatoes (1° crop)
S:May-June
H:September

Pea
S: mid March,
H: early June

Processing tomatoes (2° crop)
S:mid June
H:September

S=Sowing; H= Harvest

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Indicators calculated in Diverfarming project

Indicators classes	*Indicators Label*	*Indicators_code*
Soil	Bulk density	BD
	Soil carbon	C
	Soil carbon next 30years	C_30yr
	Total Nitrogen	Ntot
	Ratio carbon nitrogen	C/N
	Phosphorus availability in soil	Pav
	Potassium	Kex
	Calcium exchangeable	Caex
	Magnesium exchangeable	Mgex
	Copper in soil	Cu
	Soil Micronutrients (Fe,Mn, Zn)	MicroNu
	Available inorganic mineral contaminants	Contaminants
	Acidity (pH)	PH
	Soil available water capacity	AWC
Land	Cover crop	CVI
	Erosion index	EROS
Biodiversity	Bacteria biodiversity	CHAO_BI
	Bacteria diversity in soil	SHA
	Earthworm biodiversity	Earthworm
	Soil enzyme activities	Enzyme
Greenhouse Gas emissions	CO2 emissions in next 30 years	GHG_CO2
	Nitrous oxide emissions in next 30 years	GHG_N2O
Economic evaluation	Total costs	Cost
	Crop Gross Margin	GM

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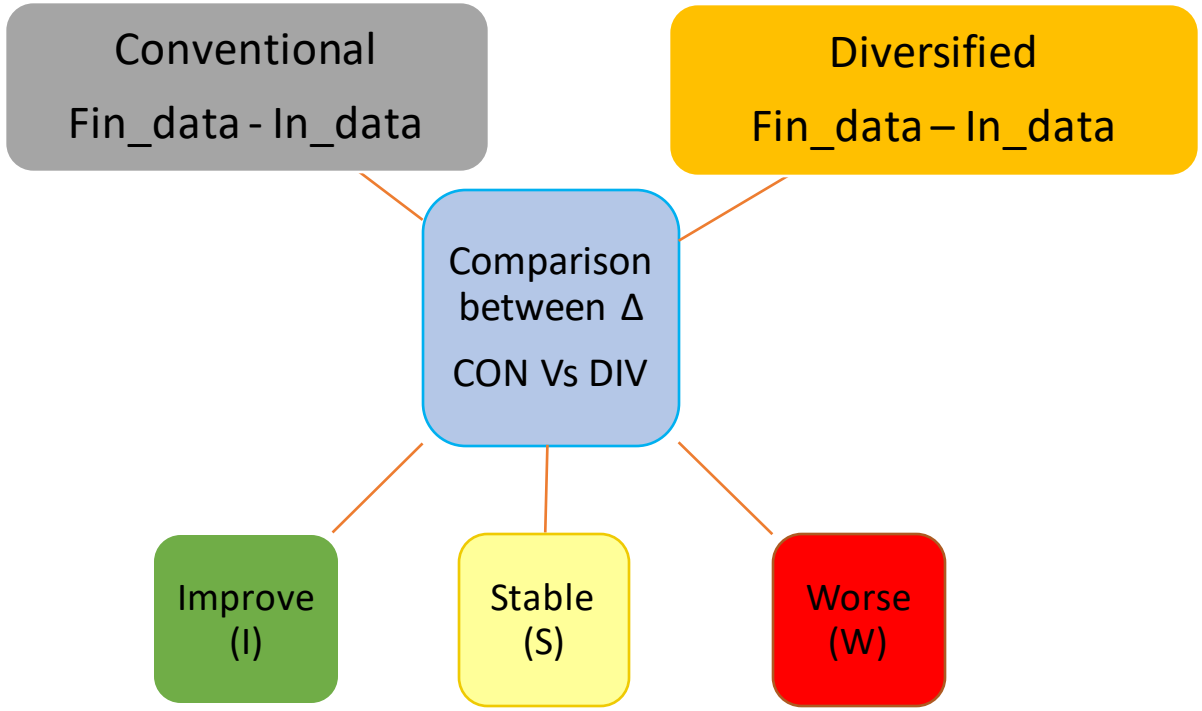
Indicators methodology



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Indicators Assessment

Index class	Soil														Land	Biodiversity	Greenhouse Gas emissions		Economic evaluation	
CS/LT	BD	C	C30	Nt	C/N	Pav	K	Caex	Mgex	Cu	MNu	CONT	PH	AWC	CVI	EZ	GHG_C	GHG_N	Cost	GM
CS5_1	I	W	I	W	W	W	W	I	S	S	W	S	S	I	I	W	I	I	HC	I
CS5_3	S	W	I	W	W	I	I	I	W	S	I	S	S	I	I	S	I	I	HC	I
CS6_2	S	W	S	I	W	I	S		I	S	I	S	S	W	I	W	W	W	HC	I
CS6_1	S	W	S	I	W	I	W		I	S	I	S	S	W	I	W	W	W	HC	I
CS7_3	S	W	I	W	I	I	S	I	I	I	W	S	S	I	I	S	W	S	HC	S
CS7_4	S	W	W	W	I	I	I	I	I	I	W	S	S	I	I	I	W	S	HC	S
LT2_1	S	S	I	I	I	I	I	I	S	W	I		S	S			I	S		
LT2_2	S	S	I	I	I	I	I	S	S	S	I		S	S			W	S		
LT2_4	S	I	S	I	I	S	S	I	S	S	I		S	S			W	S		

CS5-CS6-CS7: rotation tomato-wheat- pea/tomato

LT2: Durum wheat with no tillage (NT) and rotation tick bean-durum wheat with Conventional Tillage or NT

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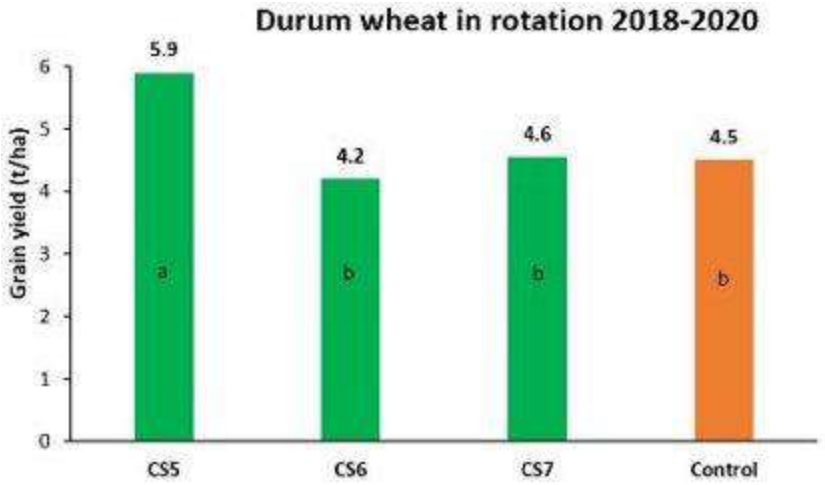
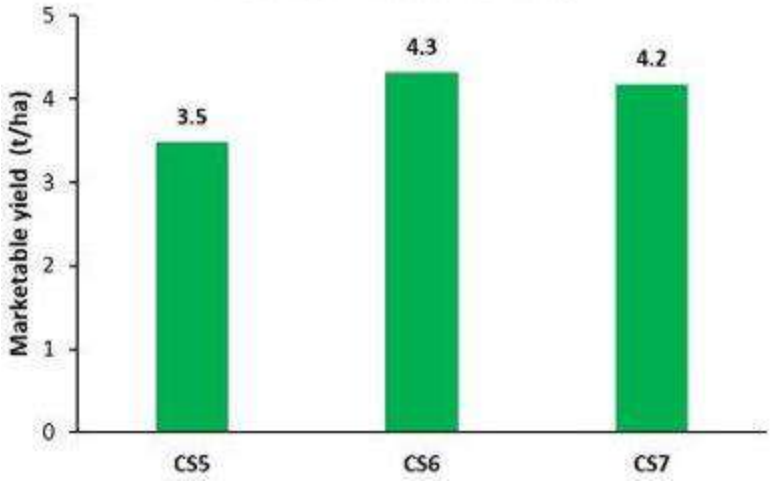
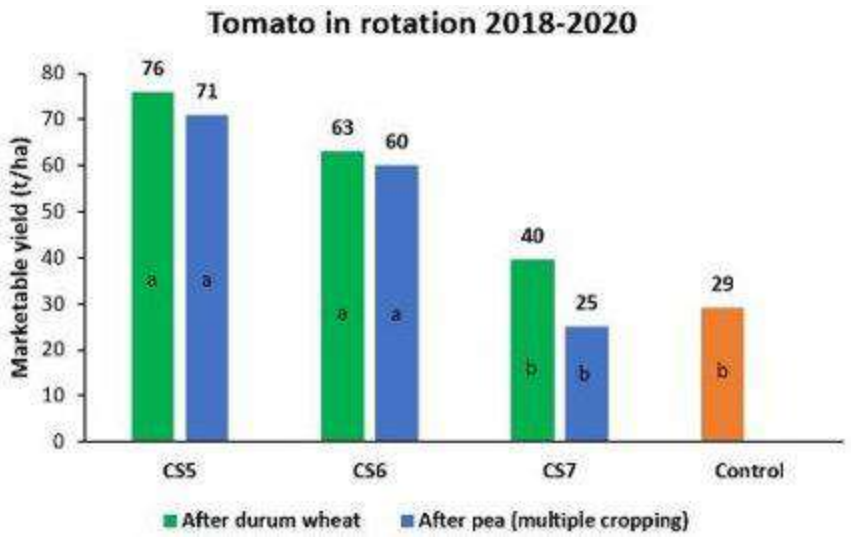
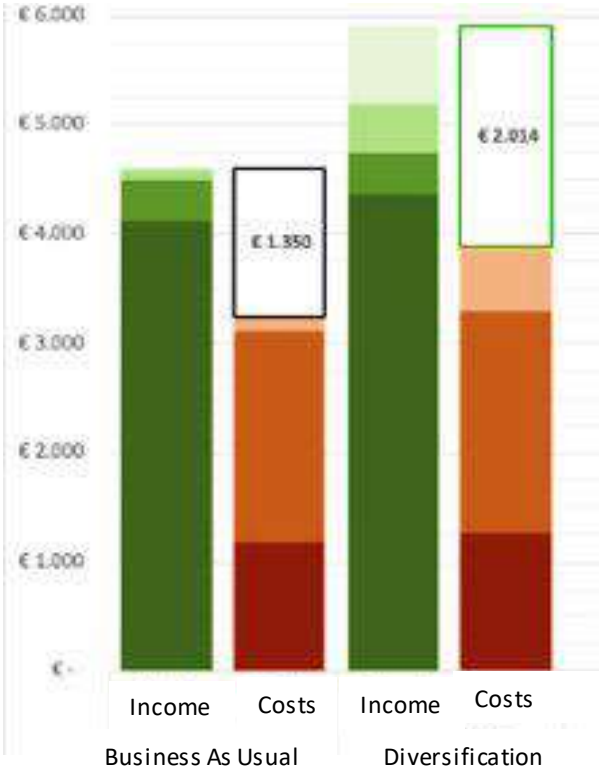
Results on crop yield and economic evaluation









CS5 economic evaluation

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Conclusions

- ✓ Overall, crop diversifications have positive impact on soil, land, and biodiversity indicators in all study areas.
- ✓ Some issues in the yield of pea and tomatoes in the 2nd crop, but the sustainability assessment must be considered as a whole, considering both the environmental and economic component.
- ✓ Economic indicators are almost “stable” respect crop conventional management, but these indicators need more data and time of experiments to be calculated in the better way.
- ✓ The “negative” results (worse) don’t mean that crop diversification has negative effects rather that, in the specific case study, the differences between the final and the initial index value (delta) in the diversified system is lower than the delta obtained in the conventional system.
- ✓ The results are influenced both by climate and soil characteristics. Where the results are not positive the new crops might need a longer time to adapt to the particular pedo-climatic conditions, or that the chosen diversification option might need some further adjustment to best fit local environmental conditions.

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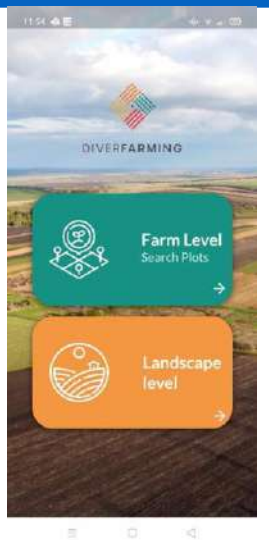
Outputs of Diverfarming

www.diverfarming.eu

APP «SUSDIVER»: APP

App Diverfarming | GET IT ON Google Play | Download on the App Store | Download Guidelines App

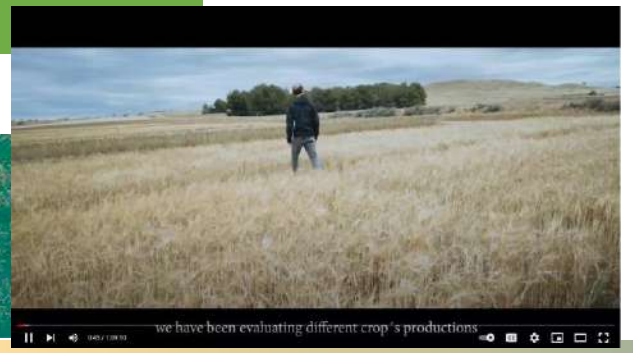


DIVERFARMING. THE DIVERSITY RESOLUTION (Documentary -ENG)

This is the story about Diverfarming, the European project which made farmers and researchers work together to reach a sustainable agriculture around Europe. Know the experience of work hand by hand for 5 years, told by farmers and researchers.

https://youtu.be/tHKrYb9hln4

YouTube



PRIMA PARTNERSHIP FOR RESEARCH AND INNOVATION IN THE MEDITERRANEAN AREA

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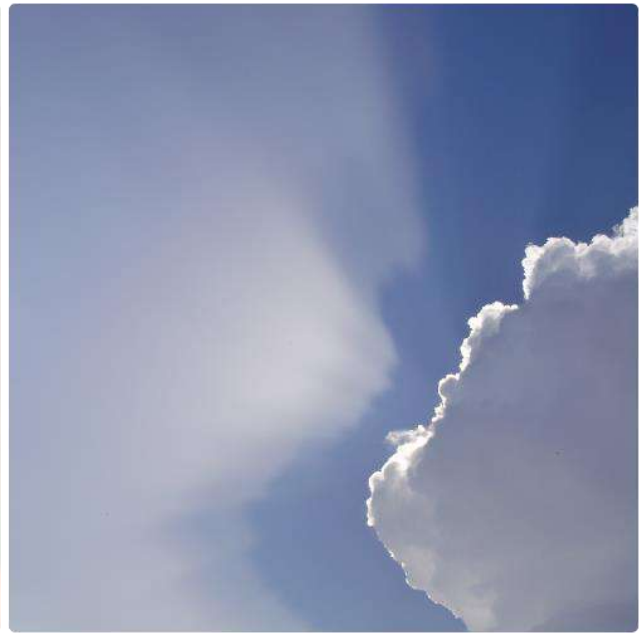
THANKS FOR YOUR ATTENTION!



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