

# Red REMEDIA

*Scientific Network on Climate Change Mitigation in  
the Agroforestry Sector*

*Alberto Sanz-Cobeña (Coord.)*

## **GRA Council Meeting**

*Madrid, 24-26 April 2023*



# Main aim/s of REMEDIA

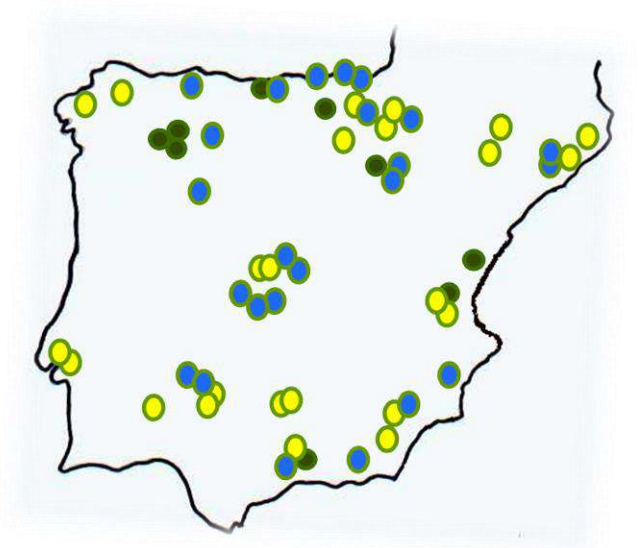
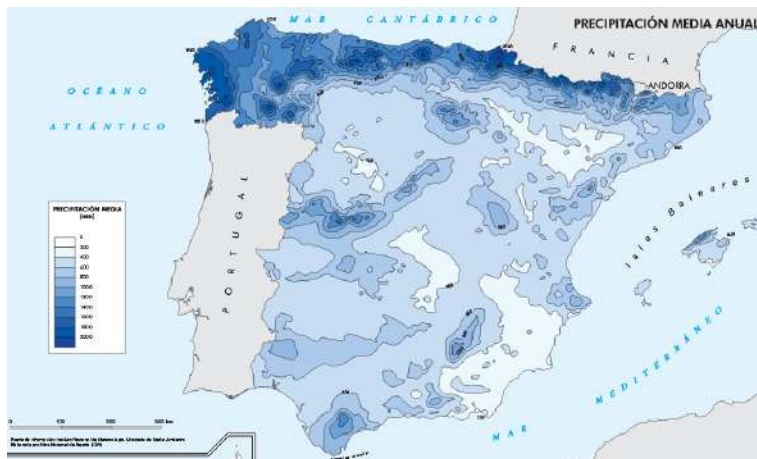
*Meeting point of scientific agents related to mitigation and adaptation to climate change in the agroforestry sector*

- ***Coordination** among researchers*
- *Enhance a **multidisciplinary** work*
- ***Dissemination** actions*
- *Collaboration with **public & private actors** aiming GHG mitigation in the agroforestry sector*

# Challenges

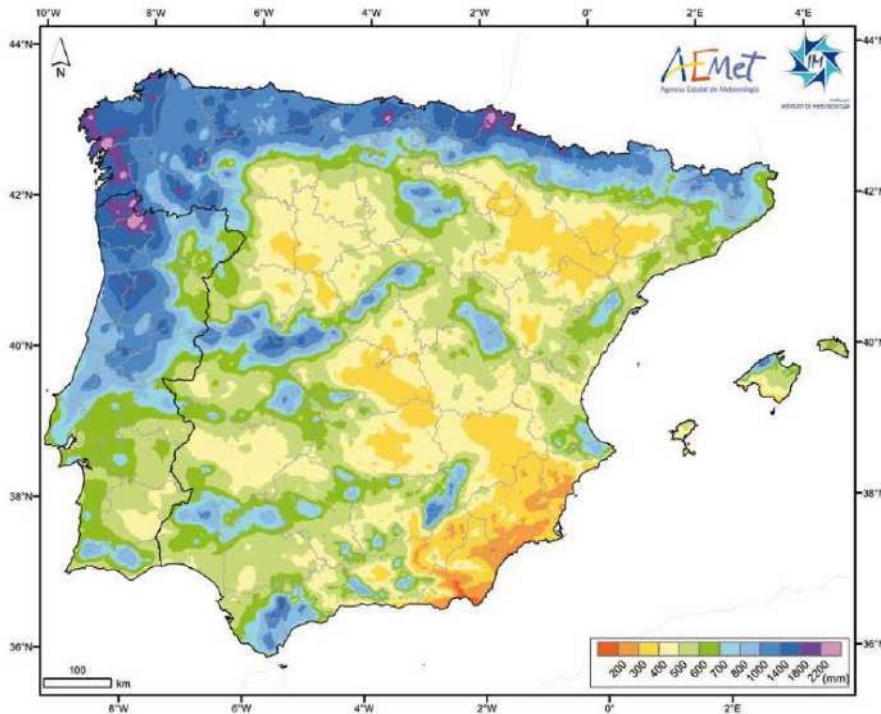
*for an effective mitigation*

- **Diversity** (of agroecosystems & research)
- **Coordinated research**
- **Policy** (inventories, targets)



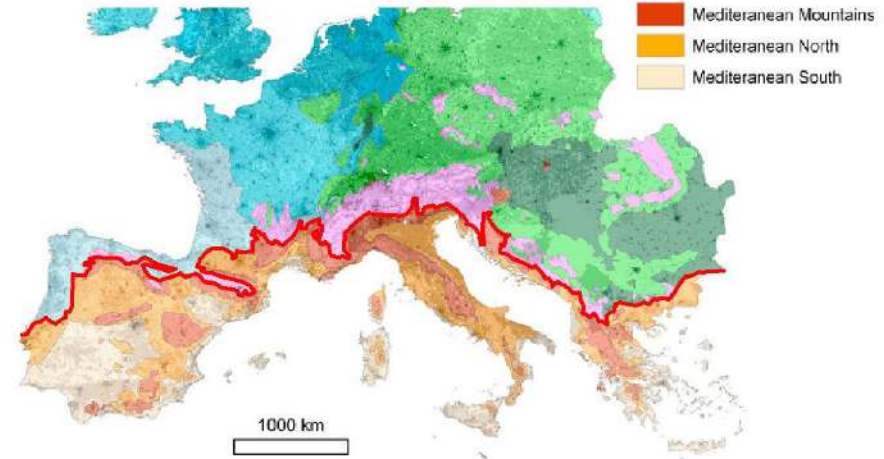
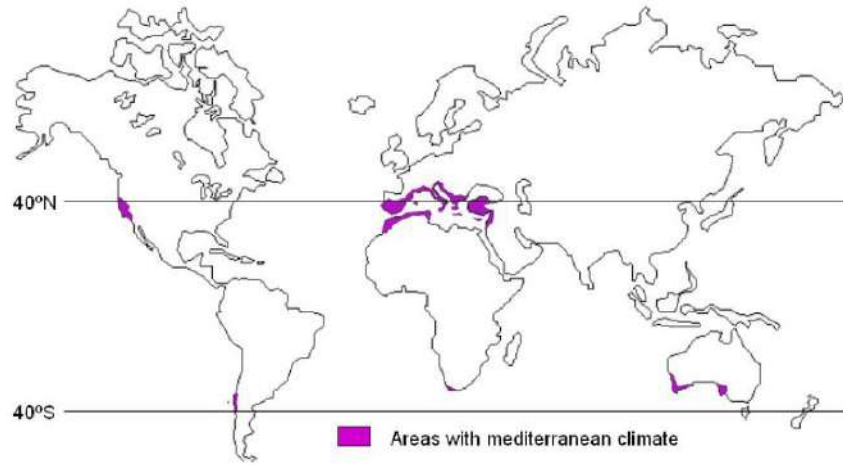
# Challenges

## #1 Diversity

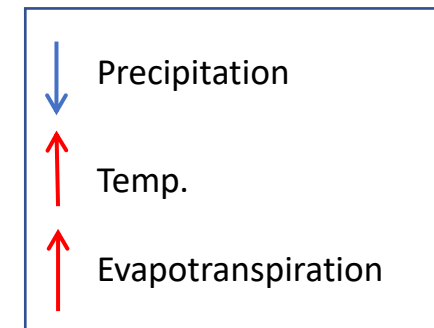
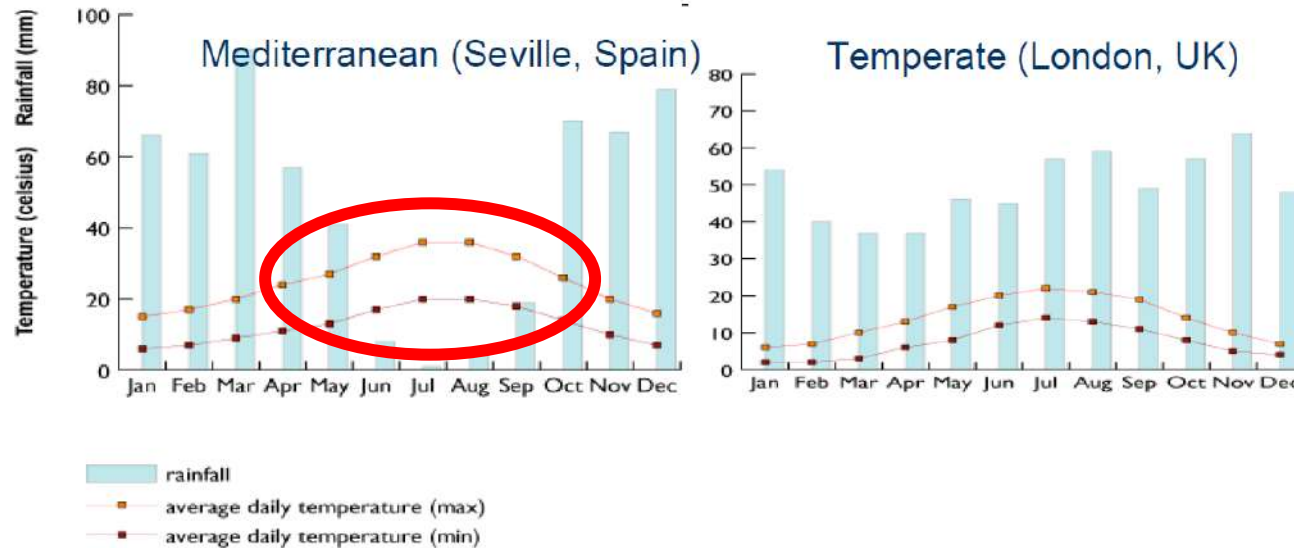


- Climate and soil
- Production systems
- Vulnerability to climate change
- Synergies Mitigation-Adaptation

# Mediterranean Climate



Metzer et al. 2010



↓  
**Water stress**

# Role & Impact of irrigation on GHG mitigation



Drip



Sprinkler



Furrow



Flood

# Challenges

## #2 Mitigation & adaptation: Understanding C seq.

- Agricultural soils
- Grazing systems
- Dehesas (“montado”)
- Agroforestry



# Challenges

## #3 Improving inventories



The image shows a Zoom meeting interface. On the left, there is a vertical black bar. The main content area is white and contains the following text and logos:

- remedia** logo: RED CIENTÍFICA DE MITIGACIÓN DE EMISIONES DE GASES DE EFECTO INVERNADERO EN EL SECTOR AGROFORESTAL.
- rednueva** logo: network for updating emission values in spanish agriculture.
- Red REMEDIA** logo.
- Speaker's video feed: A small window in the top right corner shows a man speaking.

“La contribución de los **documentos zootécnicos** de balance alimentario a los **inventarios** de gases de la **ganadería**”

*21 de mayo de 2020*

**Salvador Calvet Sanz**  
Universitat Politècnica de Valencia  
Coordinador de Red REMEDIA  
<https://redremedia.wordpress.com/>

**David Yáñez Ruiz**  
CSIC – Estación Experimental del Zaidín  
Coordinador de Red NUEVA  
<https://www.rednueva.es/>

Zoom logo is partially visible in the bottom right corner.



# Challenges

## #4 Research programmes

- Research **priorities** on mitigating GHG
- **Diversity** of funding schemes
- **Regional vs. national** priorities
- **Environmental vs. productive** perspectives
- More focus on **innovation**
- **Barriers** for an effective **communication & dissemination**

# Our role

## Science



Strategies for greenhouse gas emissions mitigation in Mediterranean agriculture: A review

A. Sanz-Cobena<sup>a,\*</sup>, L. Lassaletta<sup>b</sup>, E. Aguilera Iglesias<sup>a</sup>, B. Sánchez<sup>c</sup>, G. Guardiola<sup>d</sup>, D. I. Pujuguet Barriolomé<sup>e</sup>, R. Murral<sup>f</sup>, E. Ca A. Mejide<sup>g</sup>, G. Pardo<sup>h</sup>, J. Alvaro-Fuentes<sup>i</sup>, S. González-Ubierna<sup>j</sup>, M.L. Cayuela<sup>k</sup>, S. M. Quemada<sup>l</sup>, F. Estelles<sup>m</sup>, S. Calvet<sup>n</sup>, H.J. B.S. Gimeno<sup>o</sup>, A. Vallejo<sup>p</sup>, P. Smith<sup>q</sup>

\*Corresponding author. E-mail address: asanz@itarratona.es (A. Sanz-Cobena).

http://dx.doi.org/10.1016/j.agee.2019.107069

Direct nitrous oxide emissions in Mediterranean climate cropping systems: Emission factors based on a meta-analysis of available measurement data

Maria L. Cayuela<sup>a,\*</sup>, Eduardo Aguilera<sup>b</sup>, Alberto Sanz-Cobena<sup>c</sup>, Dean C. Adams<sup>d</sup>, Diego Abalos<sup>e</sup>, Louise Barton<sup>f</sup>, Rebecca Ryals<sup>g</sup>, Whendee L. Silver<sup>h</sup>, Marta A. Alfaro<sup>i</sup>, Valentini A. Pappa<sup>j</sup>, Pete Smith<sup>k</sup>, Joseite Garnier<sup>l</sup>, Gilles Billen<sup>m</sup>, Lex Bouwman<sup>n</sup>, Alberte Boudeau<sup>o</sup>, Luis Lassaletta<sup>p</sup>

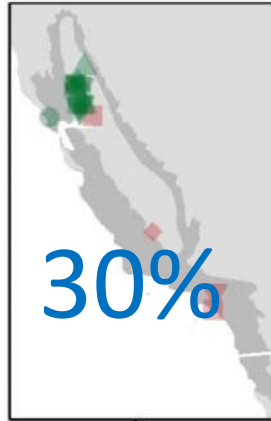
\*Corresponding author. E-mail address: mcayuela@itarratona.es (M.L. Cayuela).

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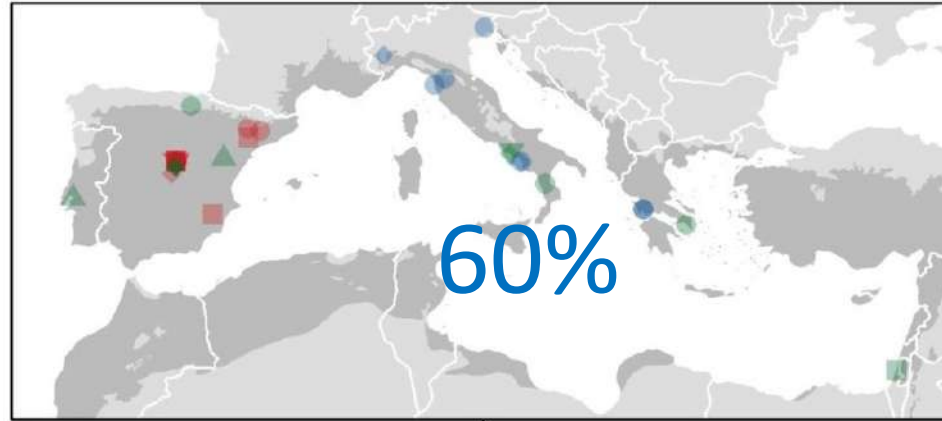
*N<sub>2</sub>O emissions from cropping systems*

# Statistical analysis of plot scale studies: review with Meta-A

## CALIFORNIA

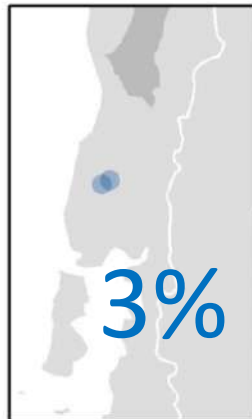


## MEDITERRANEAN SEA BASIN

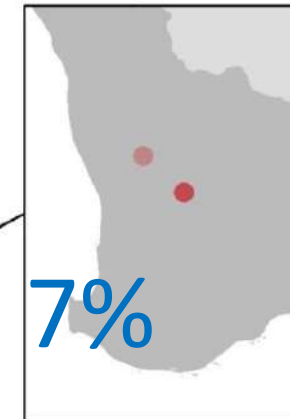


- dry, <450 mm
- medium, 450–700 mm
- humid, >700 mm
- rainfed
- drip
- ▲ flooded
- ◆ sprinkler
- ▼ furrow
- Mediterranean terrestrial eco-regions

## CHILE



## AUSTRALIA



Cayuela et al., 2017

# Results: Crop type



Maize (47)

Horticulture (34)

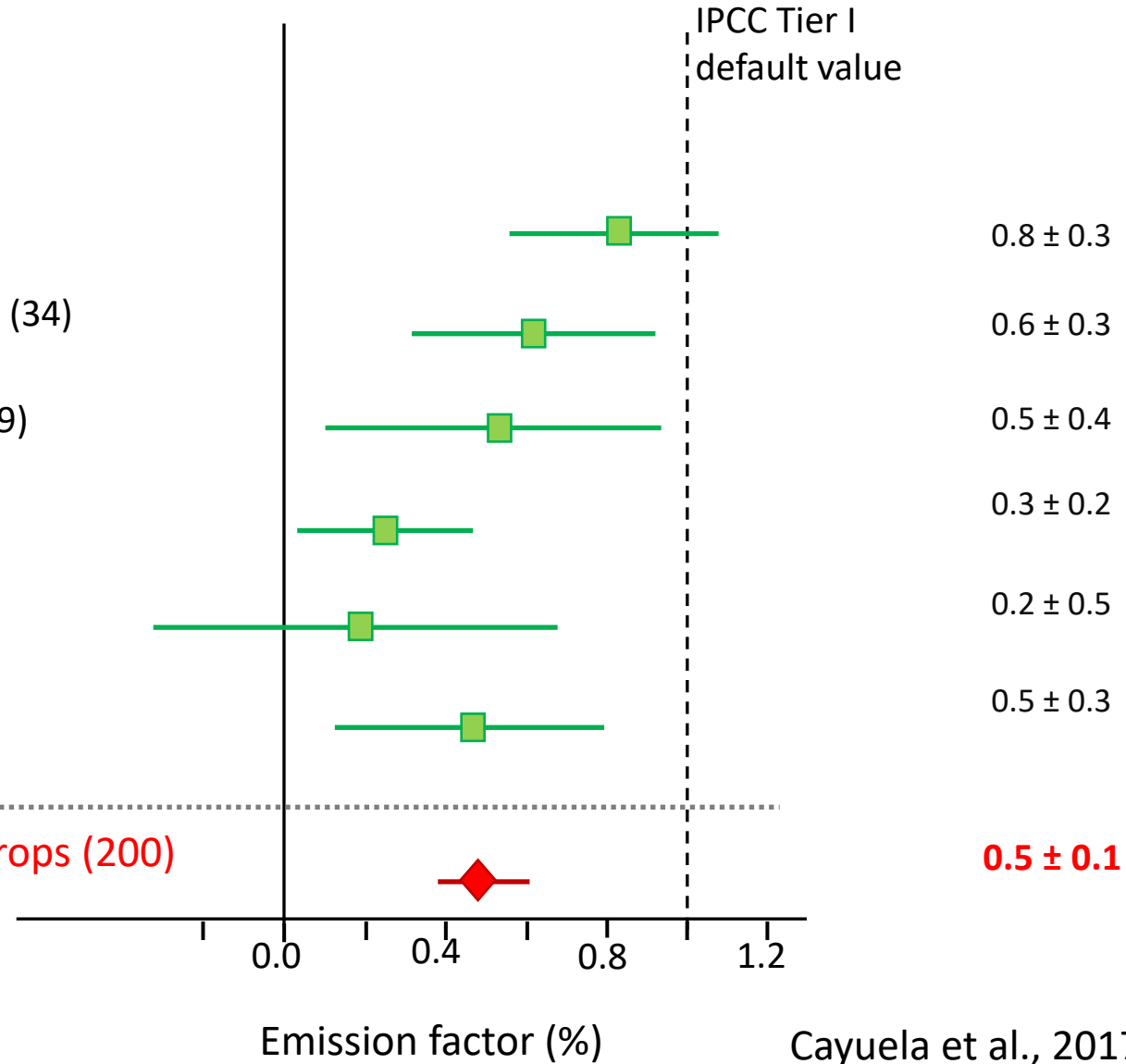
Perennial (19)

Cereal (53)

Rice (14)

Other (33)

Mean EF for Mediterranean crops (200)



# Our role

## Science

Agriculture, Ecosystems and Environment xxx (2016) xxx–xxx



Contents lists available at ScienceDirect

Agriculture, Ecosystems and Environment

journal homepage: [www.elsevier.com/locate/agee](http://www.elsevier.com/locate/agee)



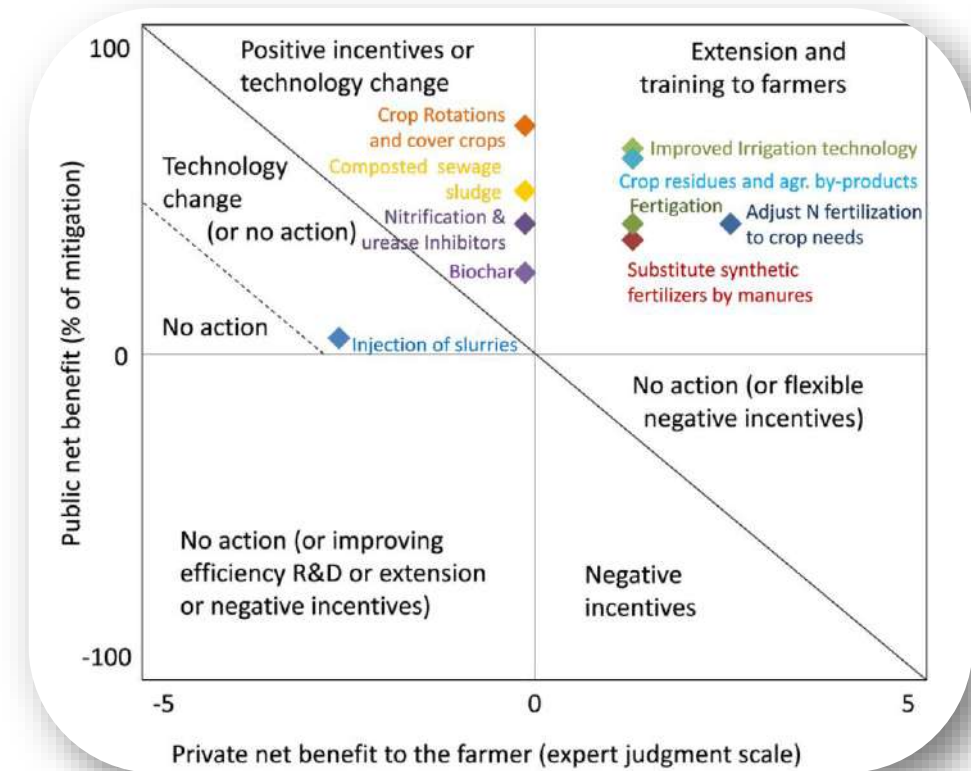
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A. Iglesias<sup>a</sup>, B. Sánchez<sup>a</sup>, G. Guardia<sup>a</sup>, D. Abalos<sup>g</sup>, D. Plaza-Bonilla<sup>h</sup>,  
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M. Quemada<sup>a</sup>, F. Estellés<sup>s</sup>, S. Calvet<sup>s</sup>, H.J.M. van Grinsven<sup>b</sup>, H. Westhoek<sup>b</sup>, M.J. Sanz<sup>d</sup>,  
B.S. Gimeno<sup>t</sup>, A. Vallejo<sup>a</sup>, P. Smith<sup>u</sup>

*Qualitative Review of GHG mitigation in Mediterranean cropping systems*

# Qualitative Review of GHG mitigation in Mediterranean cropping systems

Group of measures	Mitigation measure	Direct GHG abated	% of mitigation	Potential cost (2)	Potential benefit (2)	Potential positive and negative side-effects (3)				
						GHG mitigation out farm	GHG increase outside the farm	Reduced pollutant	Increased pollutant	Crop yield change on farm
<b>Agronomic measures (1)</b>										
Optimal fertilization	Adjust N fertilization to crop needs	N <sub>2</sub> O	30-50	**	****	Indirect N <sub>2</sub> O		NO <sub>3</sub> <sup>-</sup> , NH <sub>3</sub>		No effect
	Fertigation	N <sub>2</sub> O	30-50	**	****	Indirect N <sub>2</sub> O		NO <sub>3</sub> <sup>-</sup> , P, NO <sub>x</sub> , C sequestration		Increase
	Substitute synthetic fertilizers by manures	N <sub>2</sub> O	20-50	**	****	Indirect N <sub>2</sub> O, CO <sub>2</sub>	CH <sub>4</sub>		NH <sub>3</sub> , heavy metals	No effect
Manures and slurries	Injection of slurries	C seq.	0-10	****	**	Indirect N <sub>2</sub> O		NH <sub>3</sub>	NO <sub>3</sub> <sup>-</sup> , CH <sub>4</sub>	Decrease
	Immediate incorporation of manures after application	C seq./N <sub>2</sub> O	0-10	**	**	Indirect N <sub>2</sub> O		NH <sub>3</sub>	NO <sub>3</sub> <sup>-</sup> , CH <sub>4</sub>	Increase
Inhibitors	Use of nitrification inhibitors	N <sub>2</sub> O	30-50	****	***	Indirect N <sub>2</sub> O	CO <sub>2</sub> <sup>c</sup>	NO, NO <sub>3</sub> <sup>-</sup>	NH <sub>3</sub>	Increase <sup>a</sup>
	Use of urease inhibitors	N <sub>2</sub> O	30-60	****	***	Indirect N <sub>2</sub> O	CO <sub>2</sub> <sup>c</sup>	NO, NH <sub>3</sub>		Increase
Crop Rotations and cover crops	Cover crops	C seq.	0-10	**	***	CO <sub>2</sub> <sup>c</sup> /Indirect N <sub>2</sub> O		NH <sub>3</sub> , NO <sub>3</sub> <sup>-</sup> , P		Variable
	Crop Rotations	C seq.	-	*	***	CO <sub>2</sub> <sup>c</sup>		-	-	Increase
Irrigation	Improved Irrigation technology	N <sub>2</sub> O/CH <sub>4</sub> <sup>b</sup>	50-70	**	***	Indirect N <sub>2</sub> O		NO <sub>3</sub> <sup>-</sup>	NO, CH <sub>4</sub> <sup>b</sup>	Increase
Soil tillage	Low/no tillage	C seq.	-	**	***	CO <sub>2</sub> <sup>c</sup>		NO <sub>3</sub> , NH <sub>3</sub>	N <sub>2</sub> O	Increase
Crop residues and agro-industry by-products	Crop residues mulching	C seq.	50-70	*	**	CO <sub>2</sub> <sup>c</sup>		NH <sub>3</sub>		Long-term increase
	Crop residues	C seq.	50-70	*	*	CO <sub>2</sub> <sup>c</sup>		NH <sub>3</sub>	CH <sub>4</sub> <sup>d</sup>	Long-term



# Our role

## Training & capacity building

Logo: IAMZ-CIHEAM

Navigation: INICIO ORGANIZACIÓN RAZONES PROFESORES PROGRAMA INSCRIPCIÓN CONTACTO

Curso avanzado online

Evaluación y mitigación de las emisiones de gases de efecto invernadero en agricultura: Conceptos, métodos y herramientas de simulación

28 de septiembre a 8 de octubre de 2020



Logo: IAMZ-CIHEAM

Navigation: INICIO ORGANIZACIÓN RAZONES PROFESORES PROGRAMA INSCRIPCIÓN CONTACTO

Curso avanzado Online

Ganadería y cambio climático: Evaluación de emisiones, opciones de mitigación y estrategias de adaptación

19 - 30 octubre de 2020



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RED CIENTÍFICA DE MITIGACIÓN DE EMISIONES DE GASES DE EFECTO INVERNADERO EN EL SECTOR AGROFORESTAL

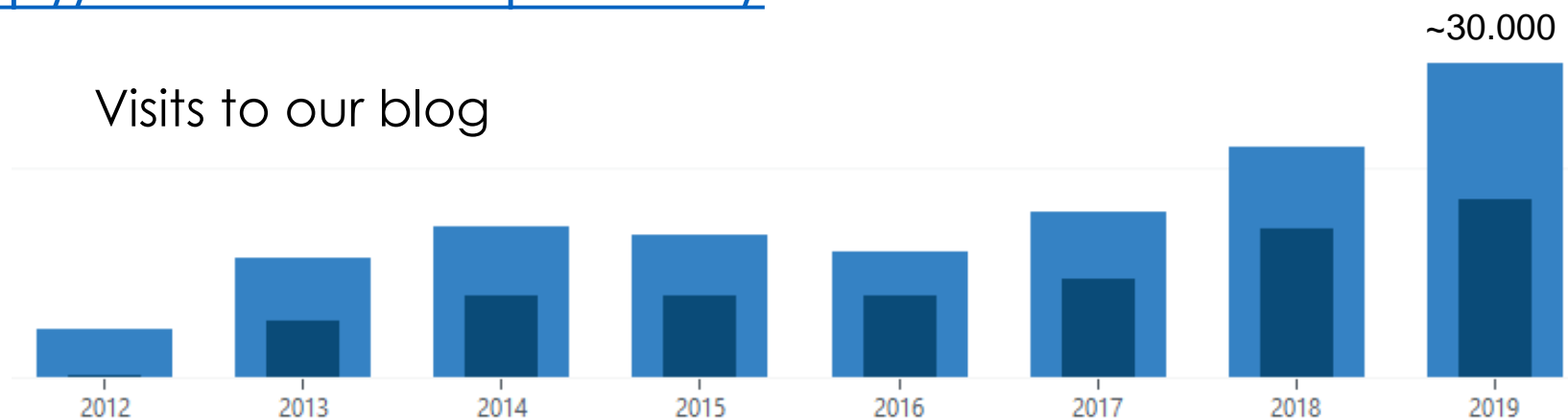
# Our role

## Dissemination

Blog and Social Networks

<http://redremedia.wordpress.com/>

Visits to our blog





# Our role

## Colaboration and transference to key actors



Request from  
beef producers

Call for participants

Work development

Good Practice document

# REMEDIA Workshops

Bilbao 2012



Zaragoza 2013



Valencia 2014



Madrid 2015



Caldes de Montbui 2017



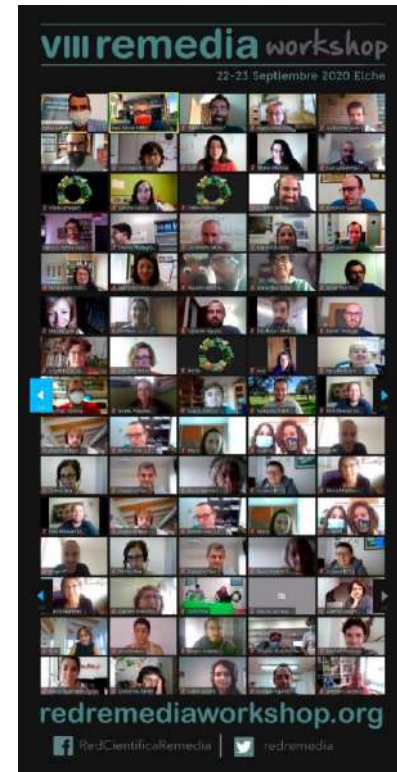
Granada 2018



Lugo 2019



Córdoba 2021



Elche, 2020

# X REMEDIA Workshop (Bilbao, 11-12 mayo 2023)

X remedía workshop



“Mirando a las raíces: carbon farming”

11-12 Mayo 2023

Ubicación: Bizkaia Aretoa-UPV/EHU paraninfo de la Universidad,  
Avenida Abandoibarra, 3 (Bilbao)

Organizadores:

remedia



bc<sup>3</sup>  
BASQUE CENTRE  
FOR CLIMATE CHANGE  
Klima Aldaketa Ikergai



# Next steps

- Keep working on **opening the network** to LATAM & Portugal
- Keep close to **GRA** (collaboration & inspiration)
- Increase **internal coordination**
- Enhance **dissemination** actions
- Looking for **synergies** Mitigation-Adaptation
- ...

# Thanks for your attention

Learn more

[www.redremedia.org](http://www.redremedia.org)



[comunicacion.remedia@gmail.com](mailto:comunicacion.remedia@gmail.com)



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