

GRA Integrative Research Group meeting

Spain

Alberto Sanz Cobeña
(Technical University of Madrid, Ceigram)



ceigram

Priorities for the IRG

- Establish **scientific relations** with other colleagues within the same research interests.
- **Share and discuss** about **constrains and limitations** of the methods used in our country for GHG modelling and inventories.

January, 2017

GRA Integrative Research Group meeting, 17th & 18th January 2018. INRA,
Paris, France.

National Resources/initiatives

- Almost no budget for coordinated initiatives in GHG mitigation in the past.
- INIA: new coordination body of GRA in Spain (national meeting on GRA, February the 6th).
 - 15 national research projects on GHG mitigation with INIA involvement
 - Participation in FACCE-JPI (Joint Programming Initiative on “Agriculture, Food security and Climate change”): 3 funded projects on the topic.
 - Paloma Melgarejo (Spanish deputy for 4x1000 initiative based at INRA, Paris).
- REMEDIA (Spanish Research Network on GHG mitigation in the agroforestry sector).

INIA funded projects within FACE-JPI

- Designchar4food (Enhancing both soil carbon sequestration and fertility while reducing soil greenhouse gas emissions through designer biochar application) IRNAS-CSIC.
- EndoGas (Manipulating Grass - Fungal Endophyte Symbioses to Reduce Greenhouse Gas Emissions and Increase Soil Carbon Sequestration in Grasslands of Finland, Spain, and the United States) IRNASA-CSIC.
- COMET-Global (Whole-farm GHG estimation and environmental diagnostics platform). CSIC.



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What is REMEDIA?

Scientific Network on GHG mitigation from the agroforestry sector (**agriculture, livestock and forestry**) in Spain

- *Coordination between researchers*
- *Taking advantage of synergies.*
- *Scientific communication*
- *Divuligation initiatives to society*
- *Collaboration with policymakers*

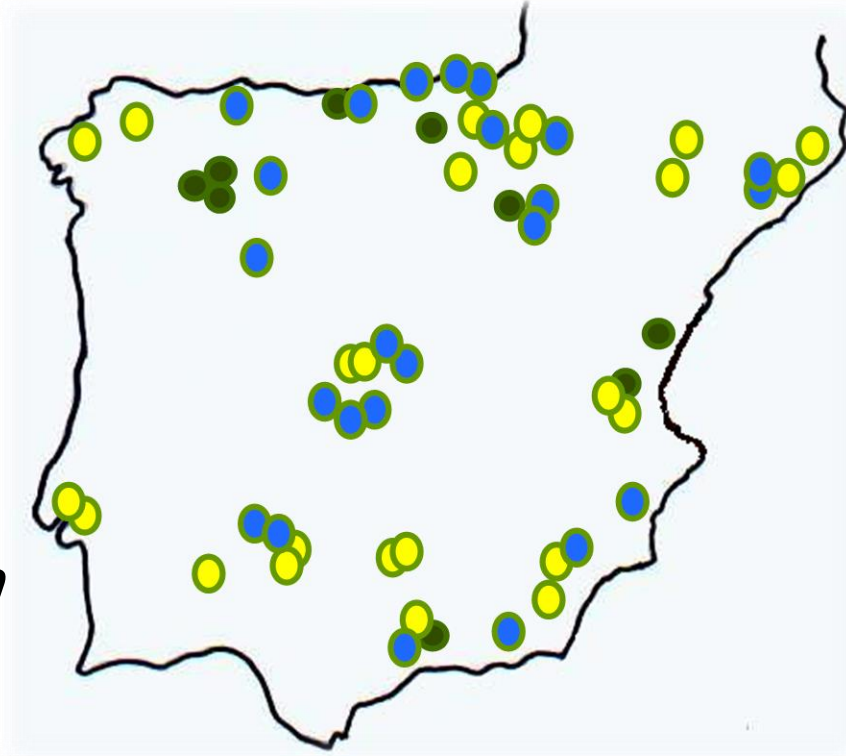
GRA Integrative Research Group meeting, 17th & 18th January 2018. INRA, Paris, France.

Who are we?

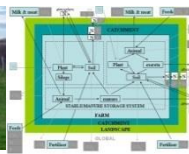
~500
researchers

*Research
Network*

*Communication
Network*



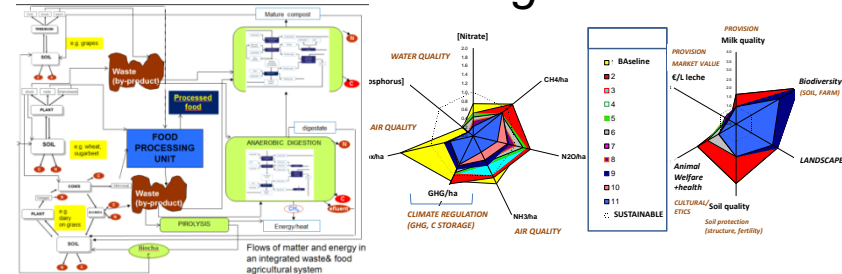
High diversity (geographically & disciplines)



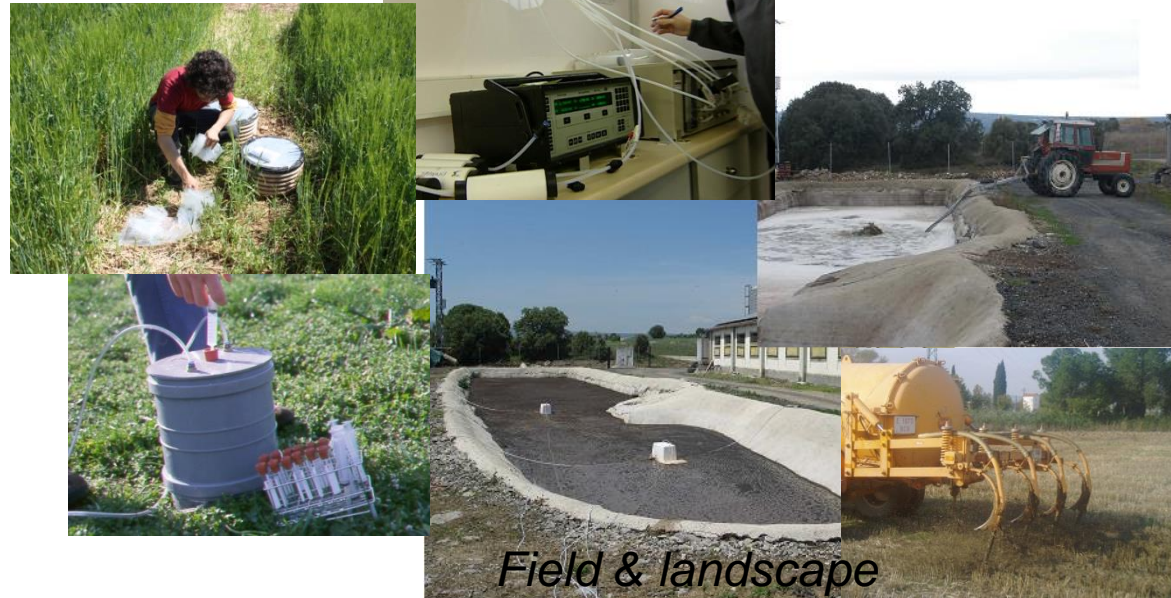
Structure of Remedia: *Research Network*

- Cropping
- Forestry
- Livestock
- GHG Inventories
- Socio-economic

Modeling & Inventories

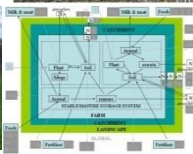


Laboratory & Greenhouse



Field & landscape

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Activities: Workshops

GRANADA, April 2018

Bilbao 2012



Zaragoza 2013



Caldes de Montbui, 2017



Valencia 2014



Madrid 2015



Activities: Blog



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

> 500 followers

> 2000 monthly visits

	Meses y años												Promedio por Día
	ENE	FEB	MAR	ABR	MAYO	JUN	JUL	AGO	SEP	OCT	NOV	DIC	
2012			540	442	180	172	380	245	446	604	776	694	
2013	845	644	650	1.1K	1.3K	945	1.0K	648	1.0K	1.2K	1.2K	869	
2014	977	1.0K	1.2K	1.6K	1.4K	702	919	1.0K	1.1K	1.2K	1.7K	1.4K	
2015	1.5K	1.4K	1.9K	1.1K	1.3K	1.0K	770	506	944	992	1.2K	910	
2016	673	811	978	1.0K	1.0K	1.1K	1.4K	695	949	936	1.3K	1.2K	
2017	2.0K	1.4K	1.6K										





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Special Issue: "Mitigation and Quantification of GHG in Mediterranean cropping systems"
Eds. Alberto Sanz-Cobena, Luis Lassaletta, Josette Garnier and Pete Smith. Eds.

Activities: master courses

http://www.iamz.ciheam.org/es/education/advanced_courses_for_professionals/course_catalogue.html



Advanced Course

**GREENHOUSE GAS ASSESSMENT AND MITIGATION
IN AGRICULTURE: CONCEPTS, METHODS
AND SIMULATION TOOLS**

Zaragoza (Spain), 12-16 March 2018



Curso Avanzado

EVALUACIÓN Y MITIGACIÓN DE LAS EMISIONES DE GASES DE EFECTO INVERNADERO EN AGRICULTURA: CONCEPTOS, MÉTODOS Y HERRAMIENTAS DE SIMULACIÓN

Zaragoza (España), 12-16 marzo 2018

1. Objetivo del curso

En el marco del Acuerdo de París sobre el Cambio Climático, todos los sectores económicos deben reducir sus emisiones de gases de efecto invernadero (GEI). La agricultura es el sector responsable aproximadamente del 10-12% de las emisiones antropogénicas de GEI en el mundo. Numerosos estudios indican que existe potencial para reducir las emisiones de GEI y favorecer el secuestro de carbono en los suelos agrícolas. No obstante, las emi-

Dry Areas (ICARDA), y la Red REMEDIA (Red científica de mitigación de emisiones de gases de efecto invernadero en el sector agroforestal). El curso se celebrará en el Instituto Agronómico Mediterráneo de Zaragoza, con profesorado de reconocida experiencia, procedente de organizaciones internacionales, y de universidades y centros de investigación de diversos países.

El curso tendrá una duración de una semana y se desarrollará, en horario de mañana y tarde, del 12 al 16 de marzo de 2018.

1. Objective of the course

In the context of the Paris Agreement on climate change, all the economic sectors have to reduce GHG emissions. The agricultural sector is responsible for about 10-12% of anthropogenic GHG emissions worldwide. Many studies have shown that there is potential to reduce GHG emissions and enhance soil carbon sequestration in agriculture. However, emissions in the agricultural sector are mostly biogenic and driven by multiple and interacting processes, which hampers reliable/robust estimates. Moreover, bridging the gap between scientific knowledge in GHG mitigation, decision making and policy implementation remains challenging.

This course will provide knowledge on the processes underlying GHG emissions and soil C sinks, measuring methodologies and modelling tools in cropping systems. Methods for national GHG inventories and mitigation options analysis, including socio-economic assessment, will be presented. Practical work based on real case studies in Mediterranean conditions will also be organized.

At the end of the course participants will have:

- Better understanding of the sources and drivers controlling GHG emissions from agricultural systems.
- An overview of state-of-the-art methods for measuring GHG emissions and soil C changes.
- Improved skills in the use of simulation models and tools for estimating GHG emissions and soil C changes at different scales.
- Insights on GHG mitigation options and their socio-economic assessment.
- Criteria for designing and improving national inventories.
- A holistic view of available tools to support informed decision making.

2. Organization

The course is jointly organized by the International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM), through the Mediterranean Agronomic Institute of Zaragoza (IAMZ), the International Center for Agricultural Research in

the Dry Areas (ICARDA), and the Red REMEDIA (Scientific network for greenhouse gas mitigation in the agroforestry sector). The course will take place at the Mediterranean Agronomic Institute of Zaragoza and will be given by well qualified lecturers from international organizations, and from universities and research centres in different countries.

The course will be held over a period of one week, from 12 to 16 March 2018, in morning and afternoon sessions.

3. Admission

The course is designed for 25 professionals with a university degree, and is specially oriented towards public and private planners and decision makers, technical advisors, agronomists, environmentalists and R&D professionals involved in the management of the environmental effects of agriculture in a context of climate change.

Given the diverse nationalities of the lecturers, knowledge of English, French or Spanish will be valued in the selection of candidates, since they will be the working languages of the course. The Organization will provide simultaneous interpretation of the lectures in these three languages.

4. Registration

Candidates must apply online at the following address:

<http://www.admission.iamz.ciheam.org/en/>

Applications must include the curriculum vitae and copy of the supporting documents most related to the subject of the course. The deadline for the submission of applications is 8 January 2018.

Applications from those candidates requiring authorization to attend the course, may be accepted provisionally.

Registration fees for the course amount to 500 euro. This sum covers tuition fees only.

5. Scholarships

Candidates from CIHEAM member countries (Albania, Algeria, Egypt, France, Greece, Italy, Lebanon, Malta, Morocco, Portugal,

Activities: *Proyectos*



CoPig:

Assessment of orange pulp (by-product) as a feeding for pigs.



Adaptation of dairy livestock to climate change



LivAGE: GHG mitigation in livestock housing

GRA Integrative Research Group meeting, 17th & 18th January 2018. INRA, Paris, France.

Activities: formation & divulgation

Webminars, MOOCs

(1) Webmail UPM Person... x BUENAS PRÁCTICAS DE... x

Es seguro | <https://www.youtube.com/watch?v=JDPp9azilMg&feature=youtu.be>



YouTube FR Buscar

UNIVERSITAS Miguel Hernández
PLAN DIVULGA UMH
BUENAS PRÁCTICAS DE MANEJO AGRÍCOLA Y SU REPERCUSIÓN EN LA MITIGACIÓN DEL CAMBIO CLIMÁTICO

Alberto Sanz-Cobeña
Profesor ETSIAAB-UPM

Buenas prácticas de manejo agrícola y su repercusión en la mitigación del cambio climático


Alberto Sanz Cobeña
CEIGRAM, ETSIAAB (UPM)

ceigram  

21 de Diciembre de 2017. Escuela Politécnica Superior de Orihuela

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

UNIVERSITAS Miguel Hernández



BUENAS PRÁCTICAS DE MANEJO AGRÍCOLA Y SU REPERCUSIÓN EN LA MITIGACIÓN DEL CAMBIO CLIMÁTICO

42 visualizaciones

1 0 COMPARTIR



(1) Webmail UPM Person... x BUENAS PRÁCTICAS DE... x

Es seguro | <https://www.youtube.com/watch?v=JDPp9azilMg&feature=youtu.be>

YouTube FR Buscar

UNIVERSITAS Miguel Hernández
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BUENAS PRÁCTICAS DE MANEJO AGRÍCOLA Y SU REPERCUSIÓN EN LA MITIGACIÓN DEL CAMBIO CLIMÁTICO

Alberto Sanz-Cobeña
Profesor ETSIAAB-UPM

Medida de N₂O en campo: Cámaras manuales

GEI

CH₄

CO₂

N₂O

Cámaras cerradas estáticas

jeringuilla 20 mL

Cromatógrafo de

V=19,3 L

Anillo metálico

10 cm

2 cajas por parcela

HP-6890

BUENAS PRÁCTICAS DE MANEJO AGRÍCOLA Y SU REPERCUSIÓN EN LA MITIGACIÓN DEL CAMBIO CLIMÁTICO

42 visualizaciones

1 0 COMPARTIR





Laura Cárdenas

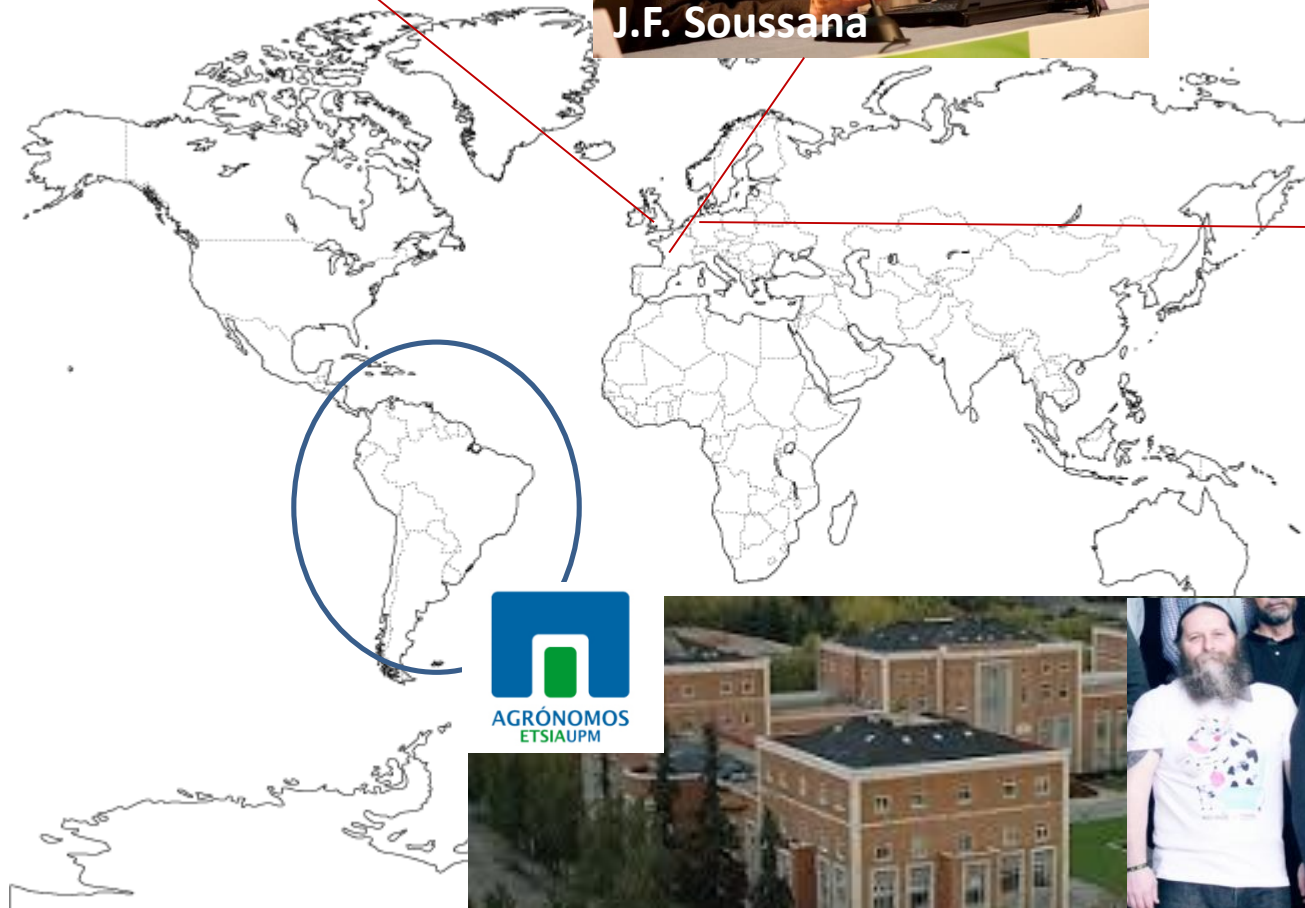
UK (RR)



France (INRA)

J.F. Soussana

of Remedia...



Julio Mosquera



AGRÓNOMOS
ETSIAUPM



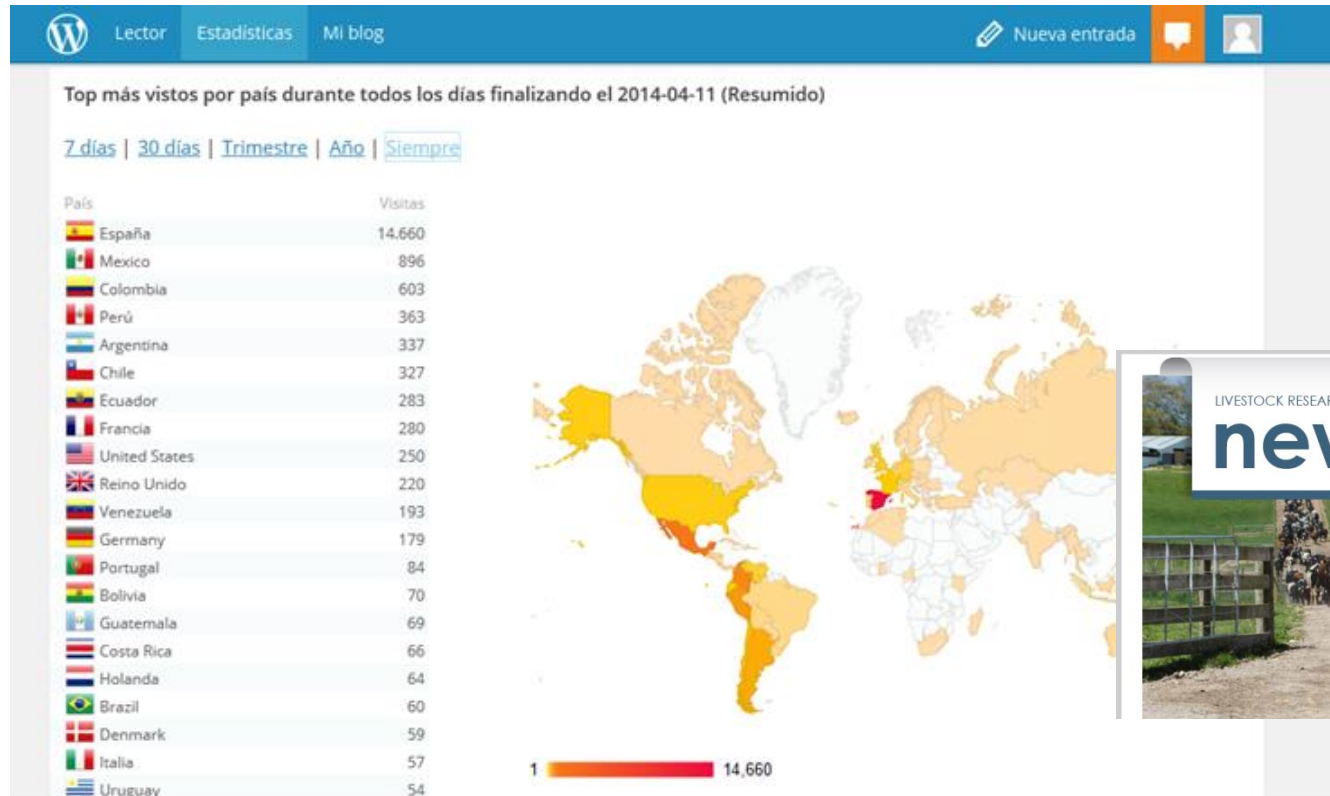
Pete Smith

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Future Challenges:

Continue with the internationalization of Remedia...

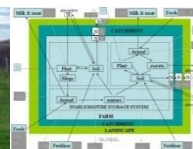


GLOBAL
RESEARCH
ALLIANCE

ON AGRICULTURAL GREENHOUSE GASES



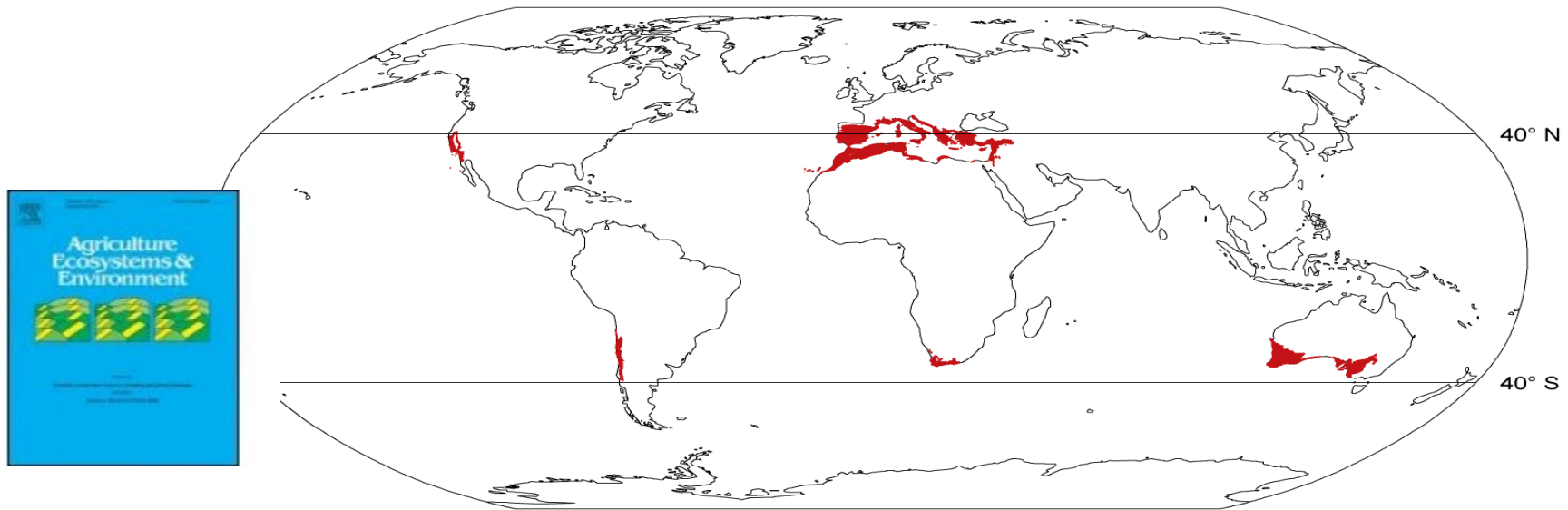
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Achievements: inventories

AGEE Special Issue on GHG mitigation in Mediterranean cropping systems



Special Issue: "Mitigation and Quantification of GHG in Mediterranean cropping systems"

Alberto Sanz-Cobena, Luis Lassaletta, Josette Garnier and Pete Smith. Eds.

Agriculture, Ecosystems & Environment Vol 238 (Feb-2017)

14 contributions, 7 on N₂O emissions

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Contents lists available at SciVerse ScienceDirect

Agriculture, Ecosystems and Environment

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



Review

The potential of organic fertilizers and water management to reduce N₂O emissions in Mediterranean climate cropping systems. A review

Eduardo Aguilera^{a,b,*}, Luis Lassaletta^{c,e}, Alberto Sanz-Cobena^d, Josette Garnier^e, Antonio Vallejo^d

^a Spanish Society of Organic Farming (SEAE), Camí del Port, S/N. Edif ECA Pat Int 1° - km 1 (Ap 397) 46470 Catarroja, Valencia, Spain

^b Universidad Pablo de Olavide, Ctra. de Utrera, km. 1, 41013, Sevilla, Spain

^c Department of Ecology, Universidad Complutense de Madrid, c/José Antonio Novais s/n 28040 Madrid, Spain

^d Escuela Técnica Superior de Ingenieros Agrónomos, Universidad Politécnica de Madrid, Ciudad Universitaria, 28040 Madrid, Spain

^e UPMC/CNRS, UMR Sisyphe, Box 123, 4, Place Jussieu, 75005 Paris, France



Contents lists available at ScienceDirect

Agriculture, Ecosystems and Environment

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



Maria L. Cayuela^{a,*}, Eduardo Aguilera^b, Alberto Sanz-Cobena^c, Dean C. Adams^{d,e},
Diego Abalos^f, Louise Barton^g, Rebecca Ryals^h, Whendee L. Silverⁱ, Marta A. Alfaro^j,
Valentini A. Pappa^{k,l}, Pete Smith^m, Josette Garnierⁿ, Gilles Billenⁿ, Lex Bouwman^{o,p},
Alberte Bondeau^q, Luis Lassaletta^o

Why should we consider a different EF for Mediterranean regions?

Different irrigation strategies

Effect on N₂O emissions?



Drip



Sprinkler

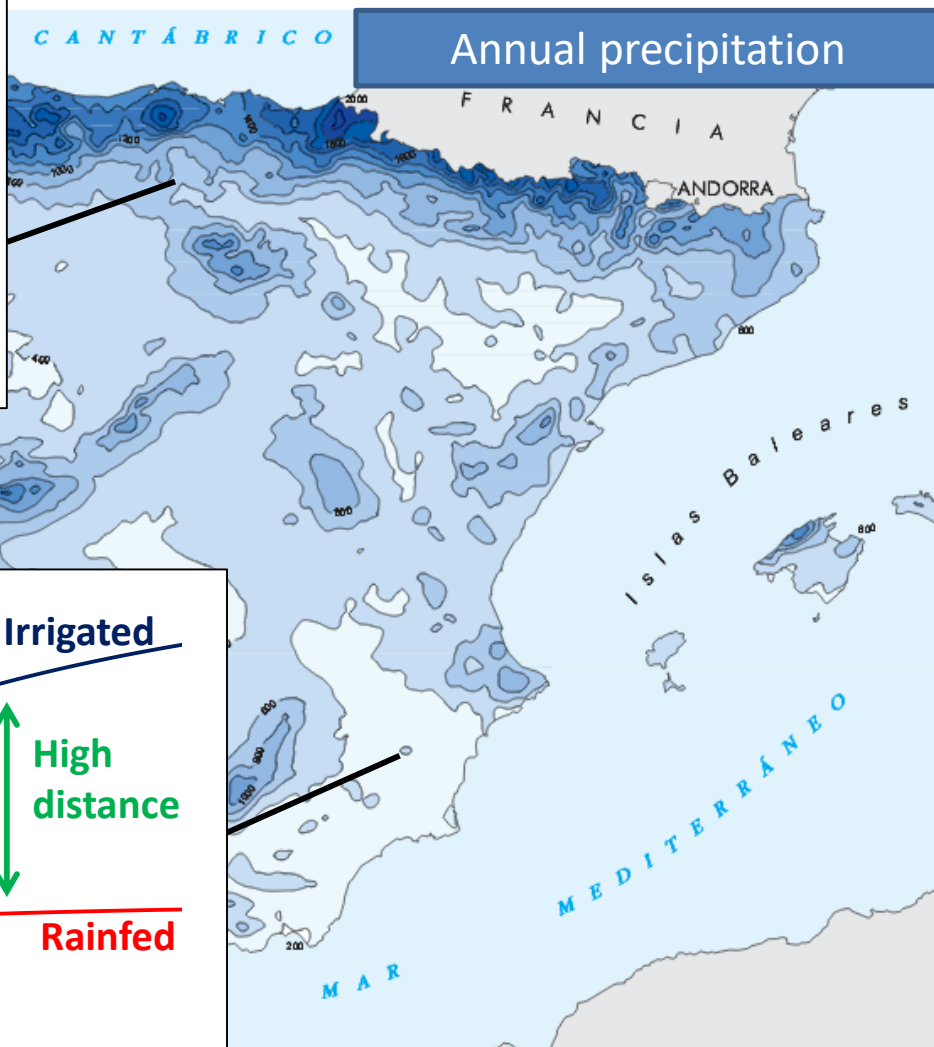
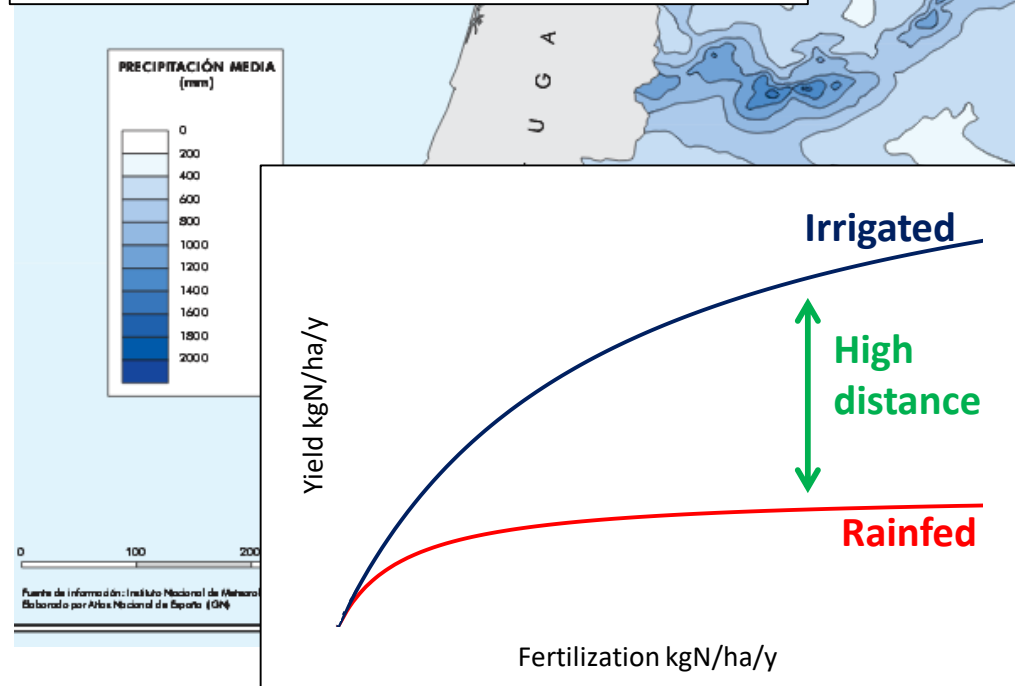
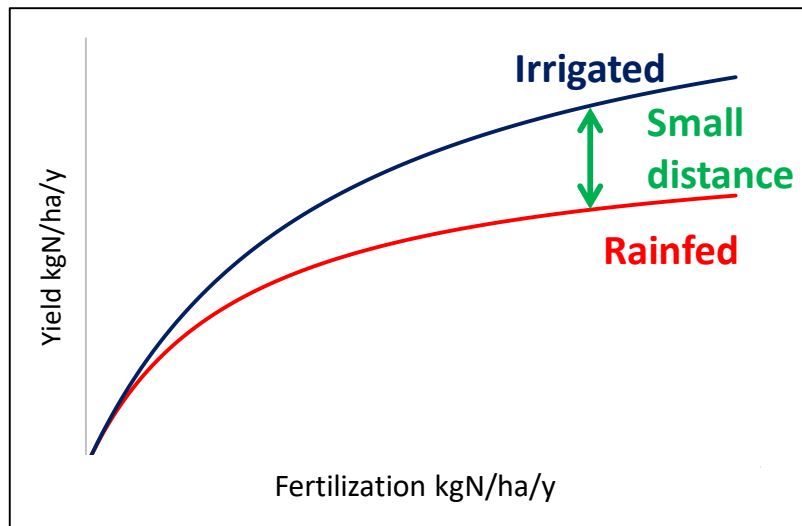


Furrow



Flood

Climatic gradient, different agronomic performance

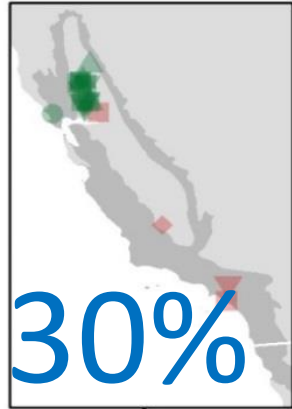


Objectives

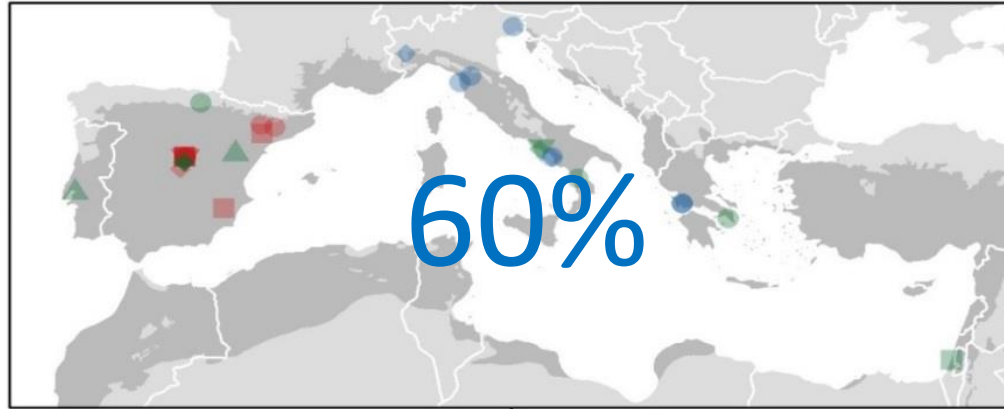
1. Synthesize available **field data** of **soil N₂O emissions** from **Mediterranean** cropping systems
2. Propose (using **meta-analysis**) a more robust and reliable regional Emission Factors (EF)
3. Identify the factors (**soil type, water management, fertilization**) controlling EF in Mediterranean crops.

Systematic review

CALIFORNIA

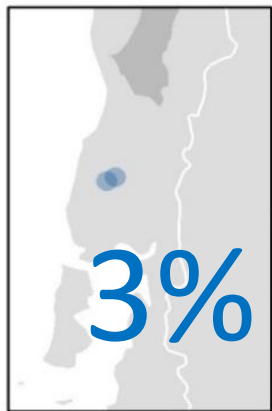


MEDITERRANEAN SEA BASIN

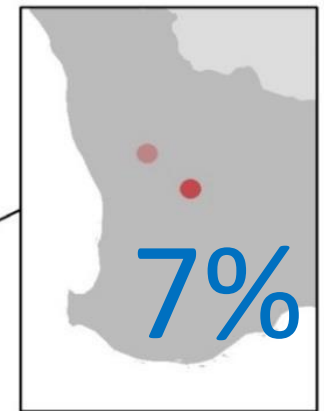


- dry, <450 mm
- medium, 450–700 mm
- humid, >700 mm
- rainfed
- drip
- ▲ flooded
- ◆ sprinkler
- ▼ furrow
- Mediterranean terrestrial eco-regions

CHILE

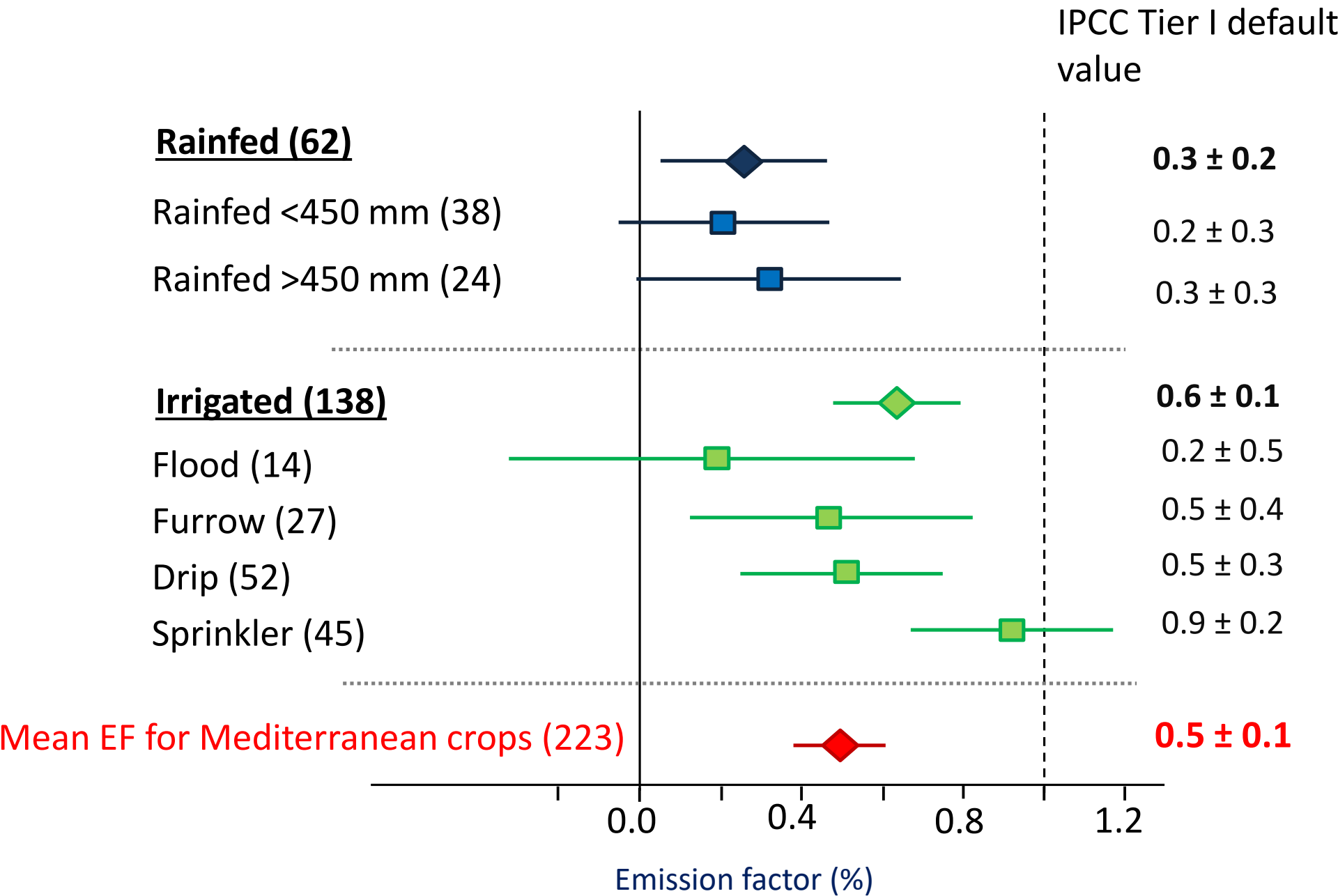


AUSTRALIA

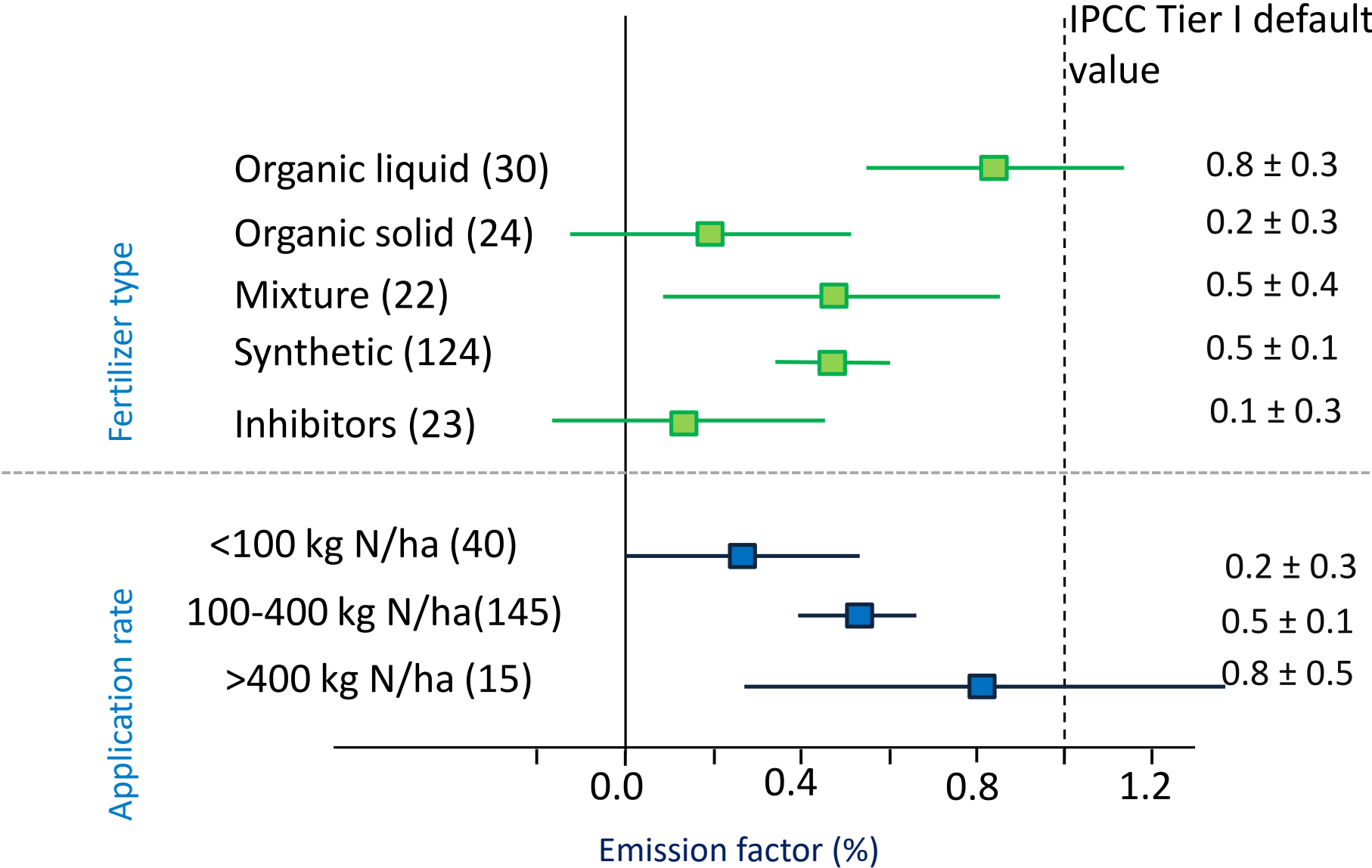


$$\text{EFFECT SIZE} = EF (\%) = \frac{N_2O_{\text{treatment}} - N_2O_{\text{control}}}{\text{applied } N} * 100$$

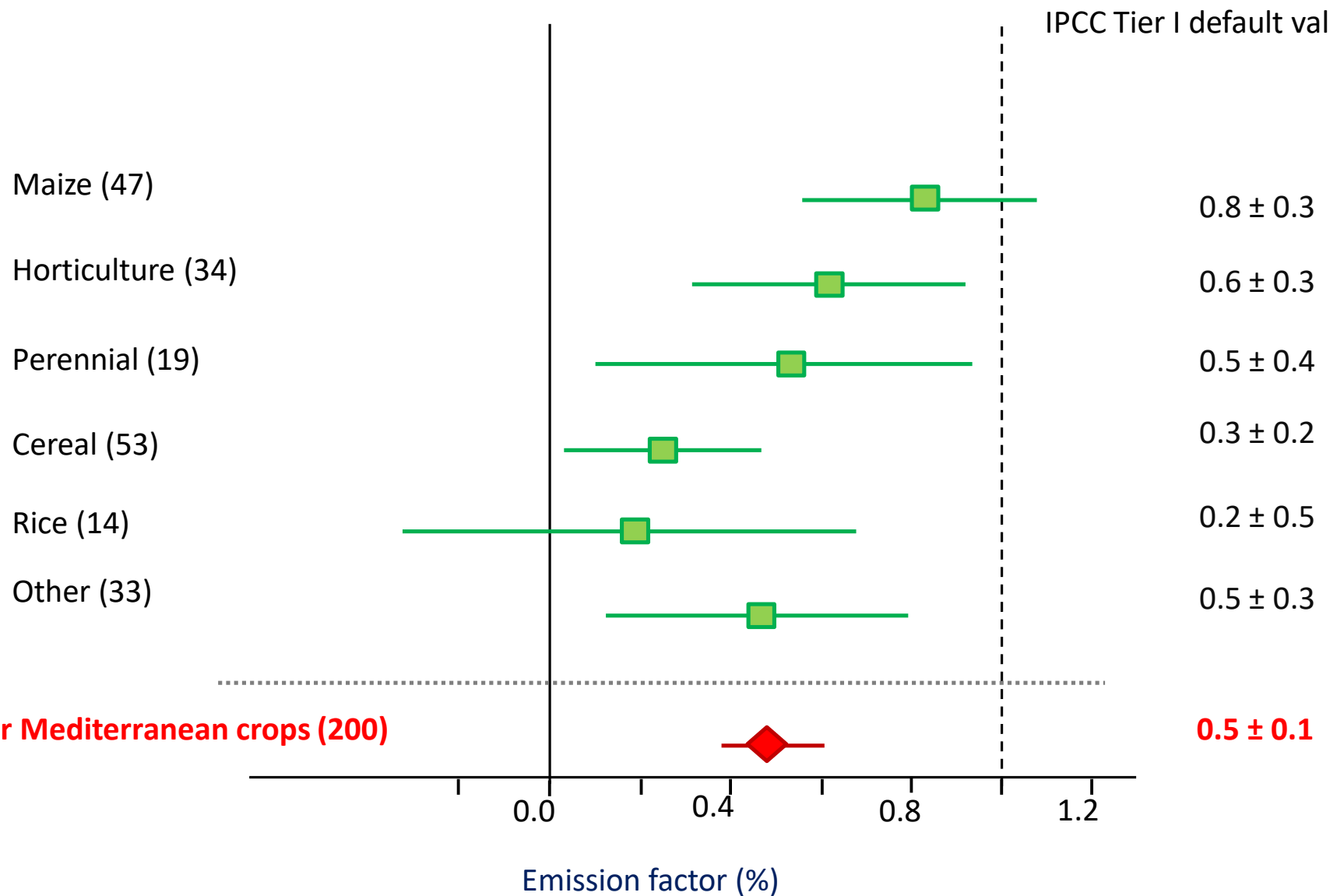
Results: Water input and management



Results: Fertilizer type + application rate



Results: Crop type



Case study: effect of EF choice on the estimation of Spanish N2O emissions

Direct emissions

	EFs	Temperate climate	Mediterranean climate
Current	Rain-fed crops	1.0%	1.0%
	Irrigated crops	1.0%	1.0%
New EFs	Rain-fed crops	1.0%	0.27%
	Irrigated furrow (27% surf.)	1.0%	0.47%
	Sprinkler (24% surface)	1.0%	0.91%
	Drip (49% surface)	1.0%	0.51%



Case study: effect of EF choice on the estimation of Spanish N₂O emissions

Direct emissions

		Temperate climate	Mediterranean climate	Total
Fertilizer N input (synth + org) (Gg N yr ⁻¹)	Rain-fed crops	137	585	722
	Irrigated crops	13	664	678
	Total	151	1249	1400
Current EFs	Rain-fed crops	1.4	5.8	7.2
Total N ₂ O emissions (Gg N yr ⁻¹)	Irrigated crops	0.1	6.6	6.8
	Total	1.5	12.5	14.0
	Rain-fed crops	1.4	1.6	3.0
New EFs	Furrow (27%)	0.0	0.8	0.9
Total N ₂ O emissions (Gg N yr ⁻¹)	Sprinkler (24%)	0.0	1.5	1.5
	Drip (49%)	0.1	1.7	1.7
	Total	1.5	5.5	7.0

50% lower

Achievements: Soil Carbon Sequestration

- Several publications (Pardo et al., 2017, AGEE; Aguilera et al., 2018, STOTEN) coming from collaborations within REMEDIA researchers.
- No nationally coordinated/funded C sequestration initiatives (with the exception of 4 x1000, participation of INIA through Paloma Melgarejo).

Further steps

- MAPAMA & INIA promoting a research project to establish Tier 2 N₂O emission factors for Spanish cropping systems (expected to start April 2018).
- Meeting organized by INIA to present its plans for GRA coordination in Spain 6th February 2018. (Hayden Montgomery, GRA).