SEAE
Sociedad Española de Agricultura Ecológica

SEAE activity in climate-related issues

- **Workshops and seminars**

"Agroecology, resilience to climate change and development cooperation": works by the members of SEAE's climate change working group

- **Networking**

REDAGRES: Latin-American network on climate change adaptation and agroecology. www.redagres.org

- **Publishing**

Special issue on climate change in AE (SEAE's magazine)

Agro-ecosystems history laboratory, Universidad Pablo de Olavide (UPO)

- Devoted to the study of the evolution of agrarian socio-ecological metabolisms through history (s. XVIII-present)

- Reconstruction of nutrient and energy (and emissions!) fluxes at multiple scales: from farm to country to world regions

- Learning from the past to design sustainable scenarios for the future: relocalization, organic farming, diet changes

- Present project: **Sustainable Farm Systems: Long-Term Socio-Ecological Metabolism in Western Agriculture**

Assessing the carbon footprint of organic and conventional crops and cropping systems in Spain

Eduardo Aguilera

Gloria Guzmán

Antonio Alonso

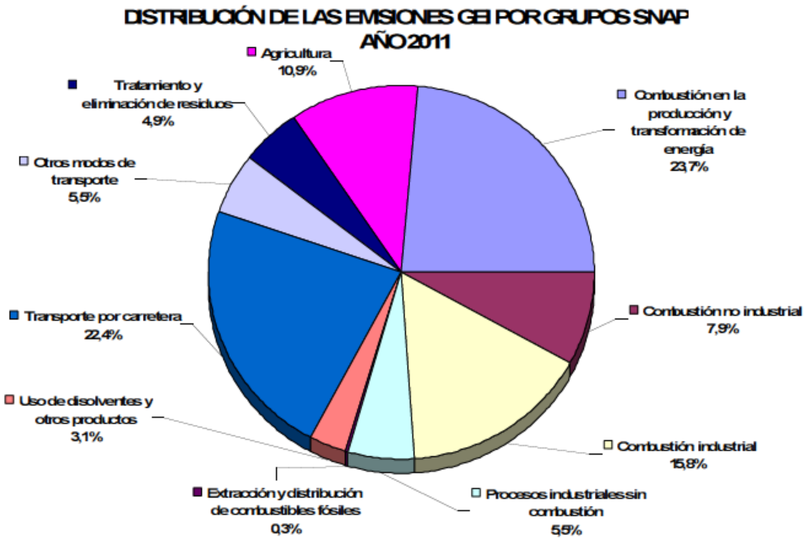
6th Meeting of the Round Table on Organic Agriculture and Climate Change (RTOACC)

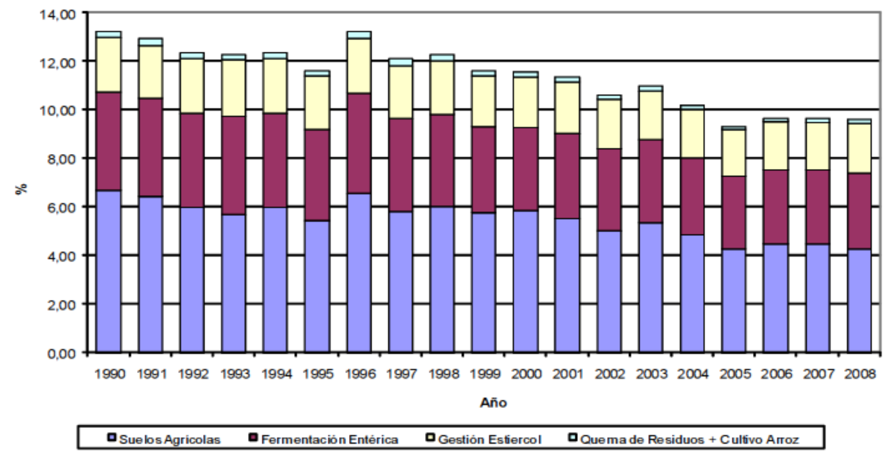
IFOAM Head Office, Bonn, Germany
11-12 June, 2013

UNIVERSIDAD PABLO DE OLAVIDE SEVILLA

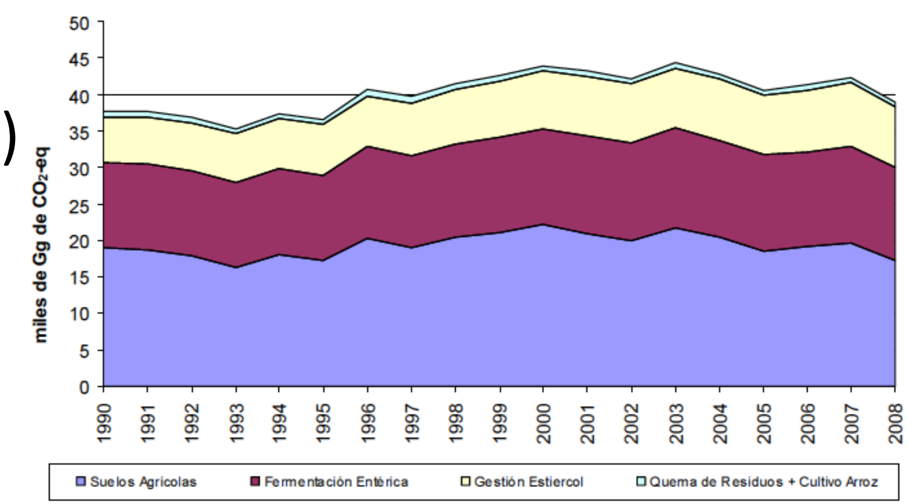
Round Table on Organic Agriculture and Climate Change

Greenhouse gas emissions in Spanish agriculture



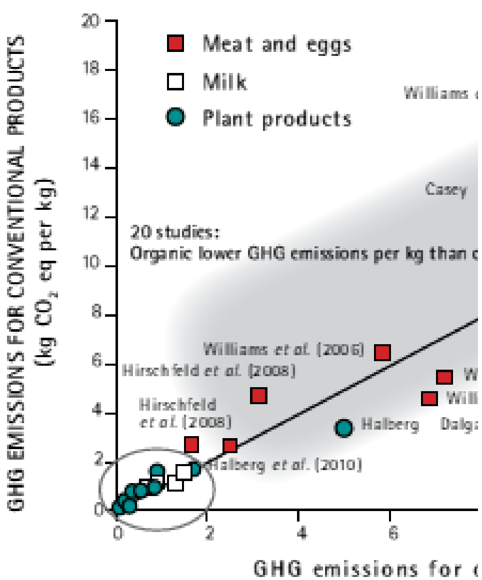


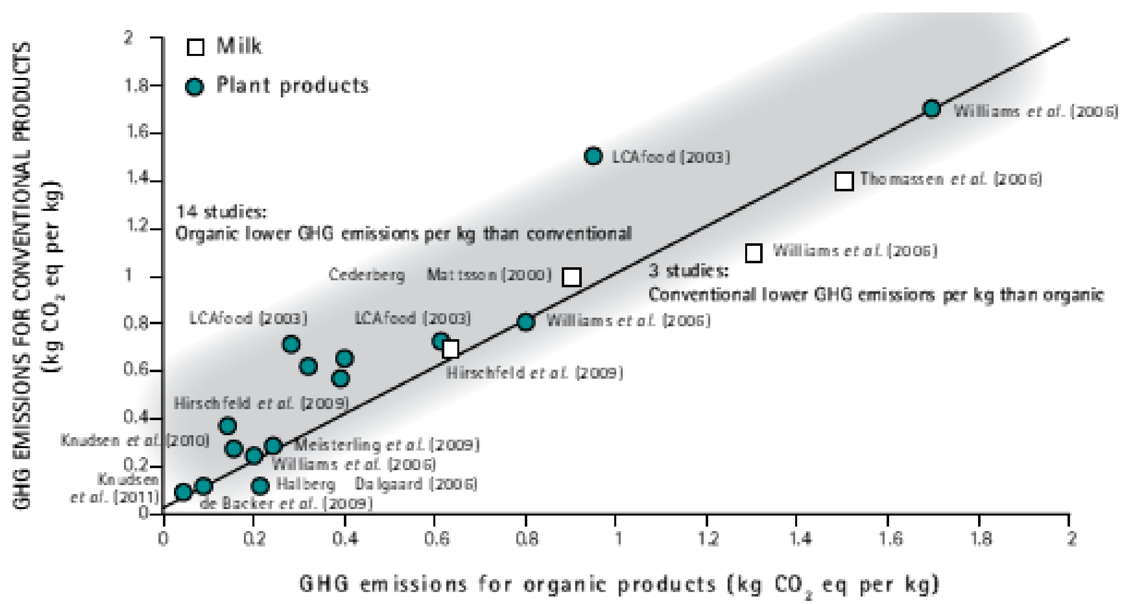
- Fossil e ct and indirect)
- Emissi
- Carbon
- Imported feed



Mediterranean organic farming

- Less fossil inputs
- Organic fertilization
- Less emissions per hectare
- Lower yields
- Yield-scaled emissions?
- Carbon sequestration?



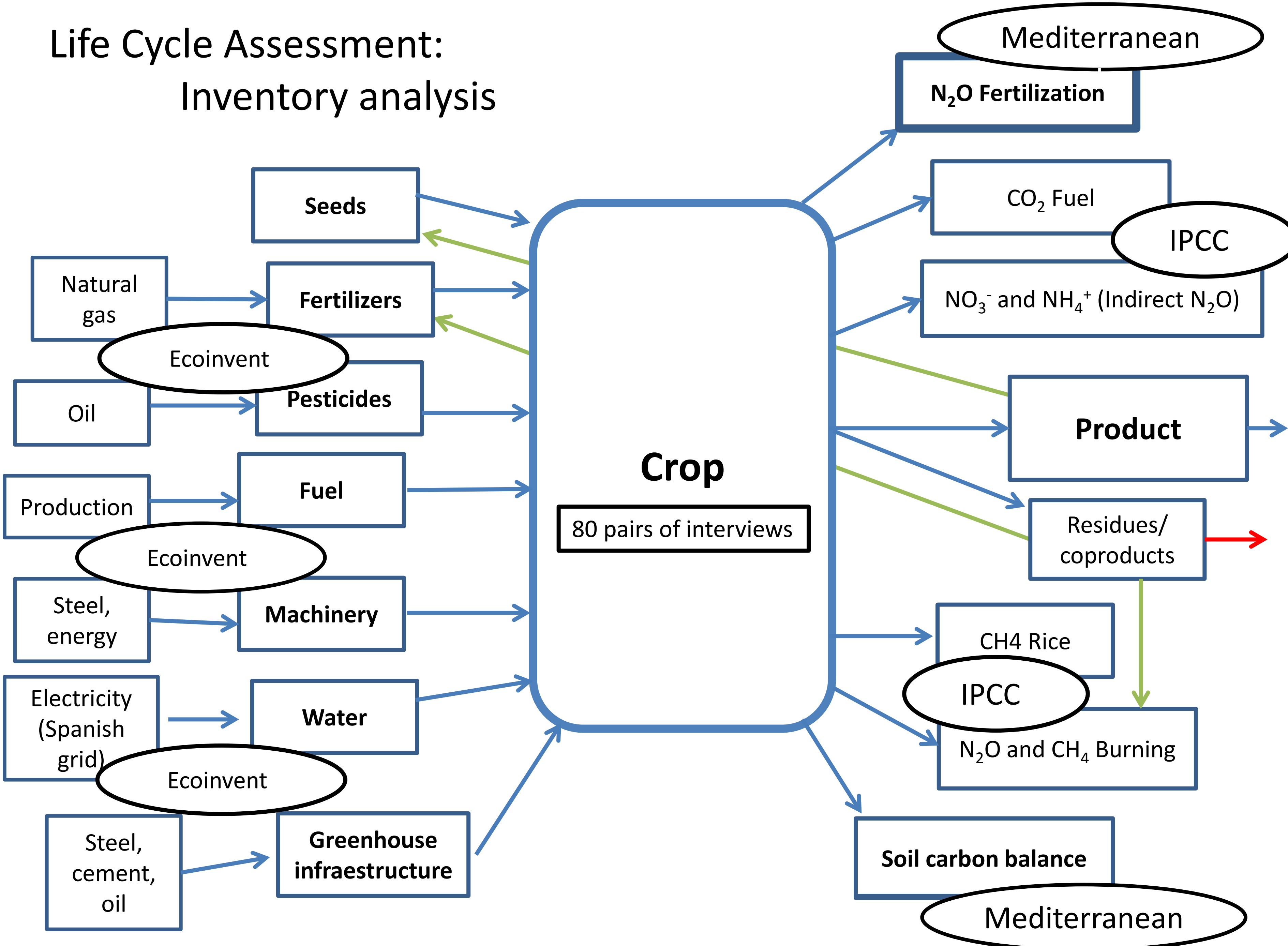


Source: Knudsen, 2011, in RTOACC, 2011

Objectives

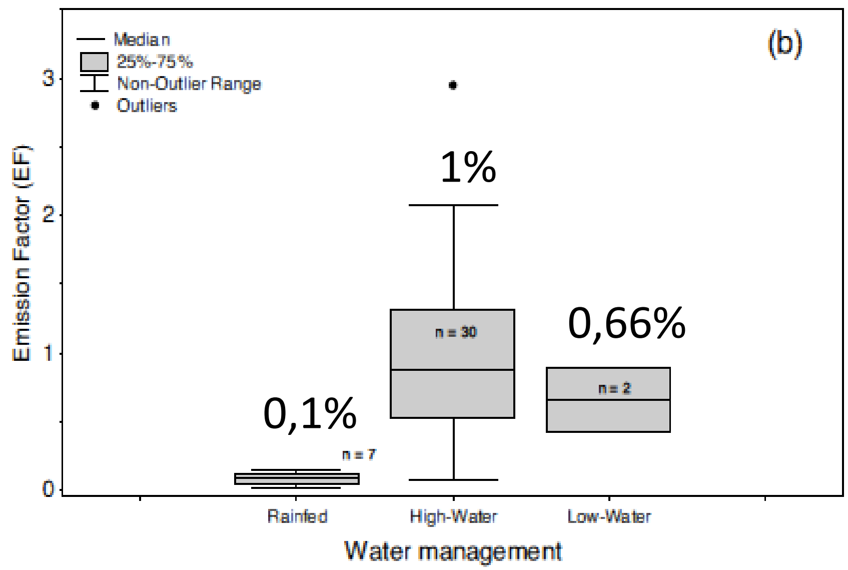
- Comparison of the GWP of organic and conventional crop products and cropping systems
- Inclussion of specifically Mediterranean N_2O emission factors
- Inclussion of soil carbon balance in carbon footprint

Life Cycle Assessment: Inventory analysis

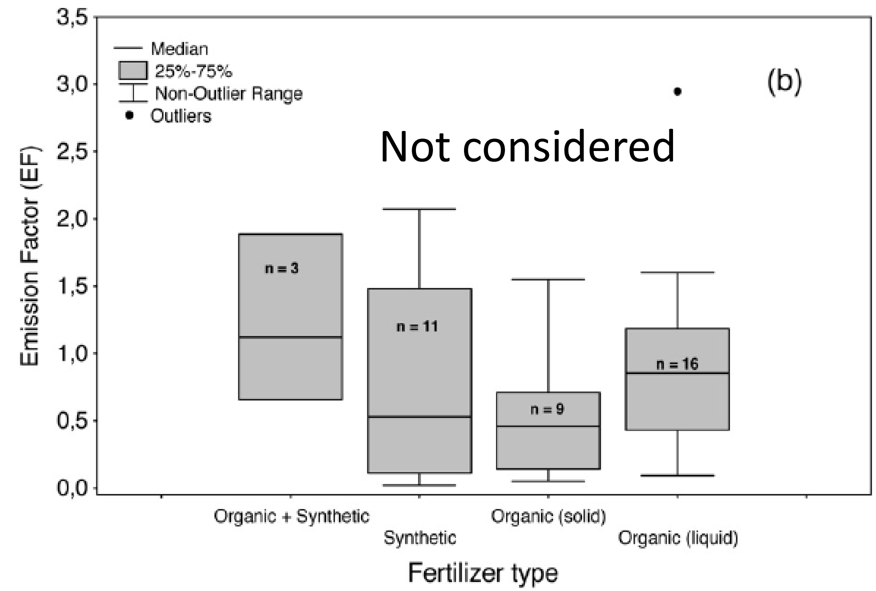


Adjusting N_2O emission to the Mediterranean climate

Irrigation



Fertilizer type



IPCC factor: 1%


Contents lists available at SciVerse ScienceDirect
Agriculture, Ecosystems and Environment
journal homepage: www.elsevier.com/locate/agee
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Review

The potential of organic fertilizers and water management to reduce N_2O 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]

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[b] Universidad Pablo de Olavide, Ctra. de Utrera, km. 1, 41013, Sevilla, Spain
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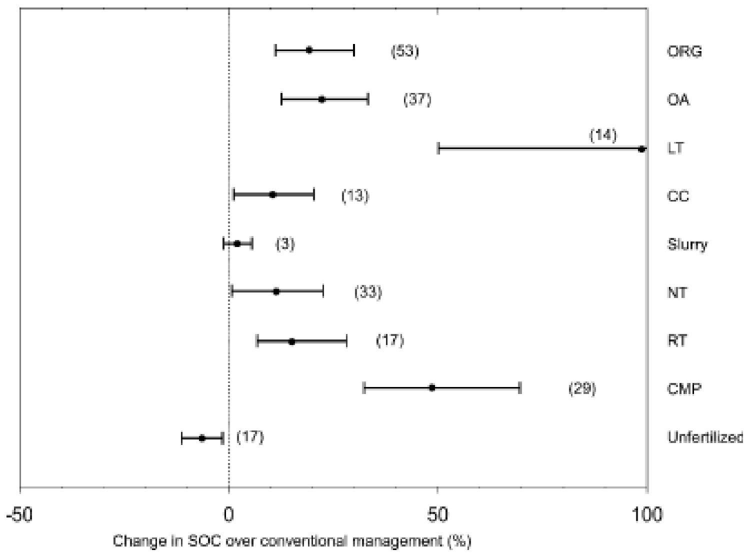
[d] Escuela Técnica Superior de Ingenieros Agrónomos, Universidad Politécnica de Madrid, Ciudad Universitaria, 28040 Madrid, Spain
[e] UPMC/CNRS, UMR Sisyphe, Box 123, 4, Place Jussieu, 75005 Paris, France

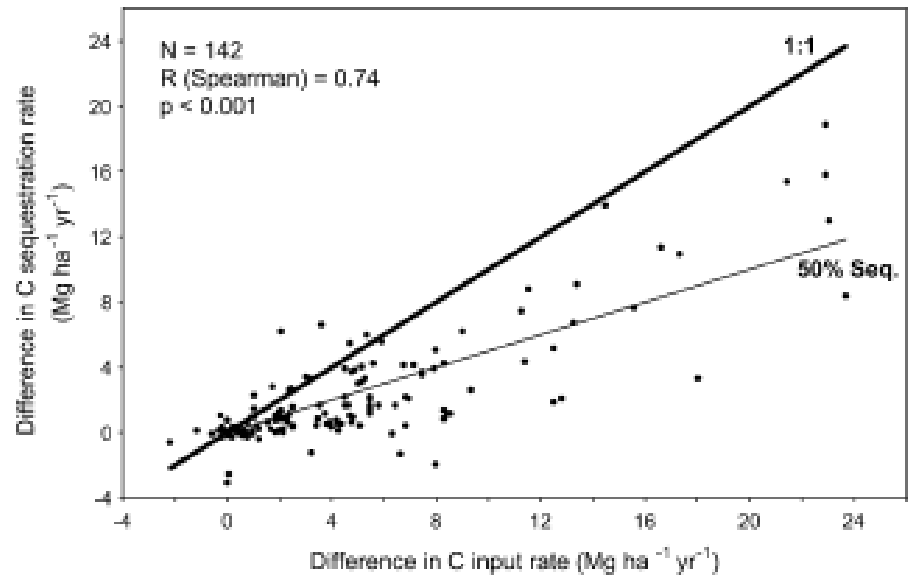
Source Aguilera et al. (2013a)

Including carbon sequestration using data from Mediterranean climate

Management type



Amount of organic input



Fertilized, no C input	0
Unfertilized, No C input	481,6 (source)
Cover crops	-269,7 (sink)
Straw	26,7%
Prunings	39,5%
Organic fertilizers	30,5%
Adjusting to 100-year	50% reduction from inital rate

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Managing soil carbon for climate change mitigation and adaptation in Mediterranean cropping systems: A meta-analysis

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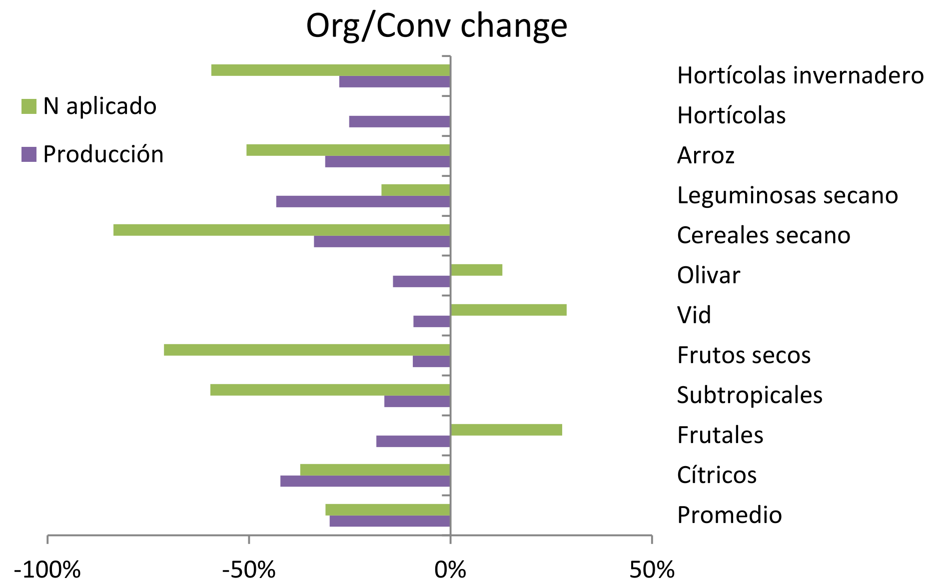
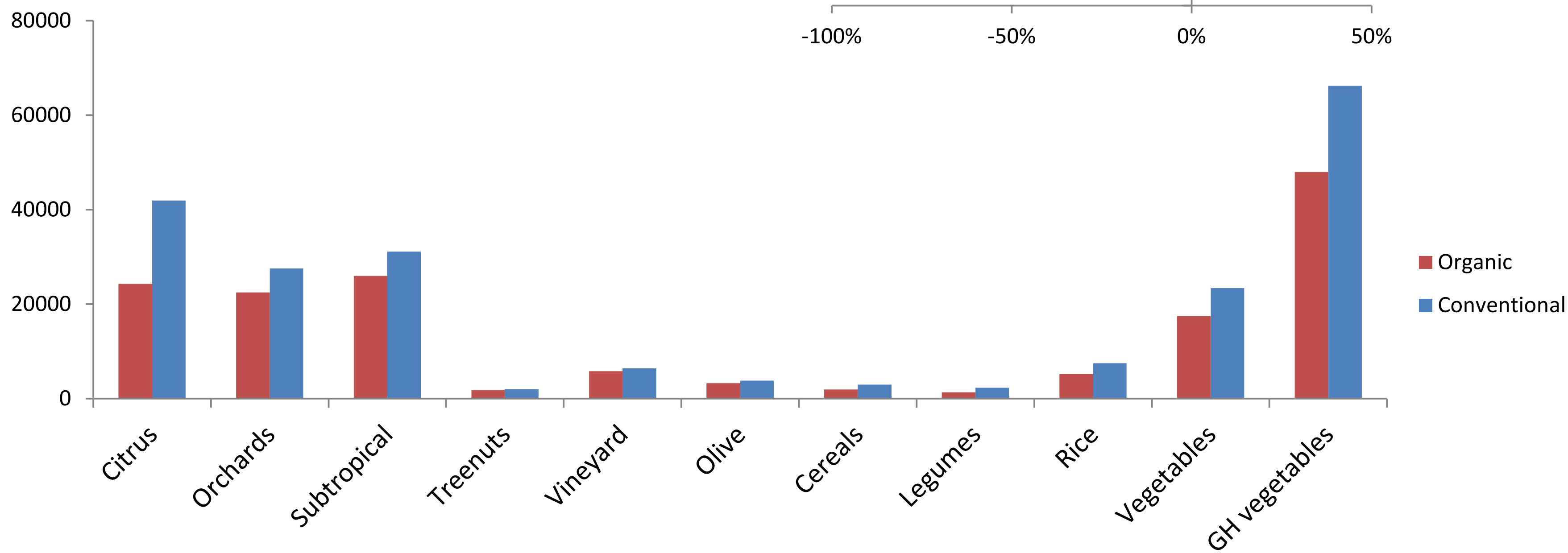
[c] Department of Ecology, Universidad Complutense de Madrid, c/José Antonio Novais, s/n, 28040 Madrid, Spain
[d] Research Institute of Organic Agriculture, Ackerstrasse, CH-5070 Frick, Switzerland
[e] Ecotoxicology of Air Pollution, CIEMAT, Avda. Complutense 22, 28040 Madrid, Spain

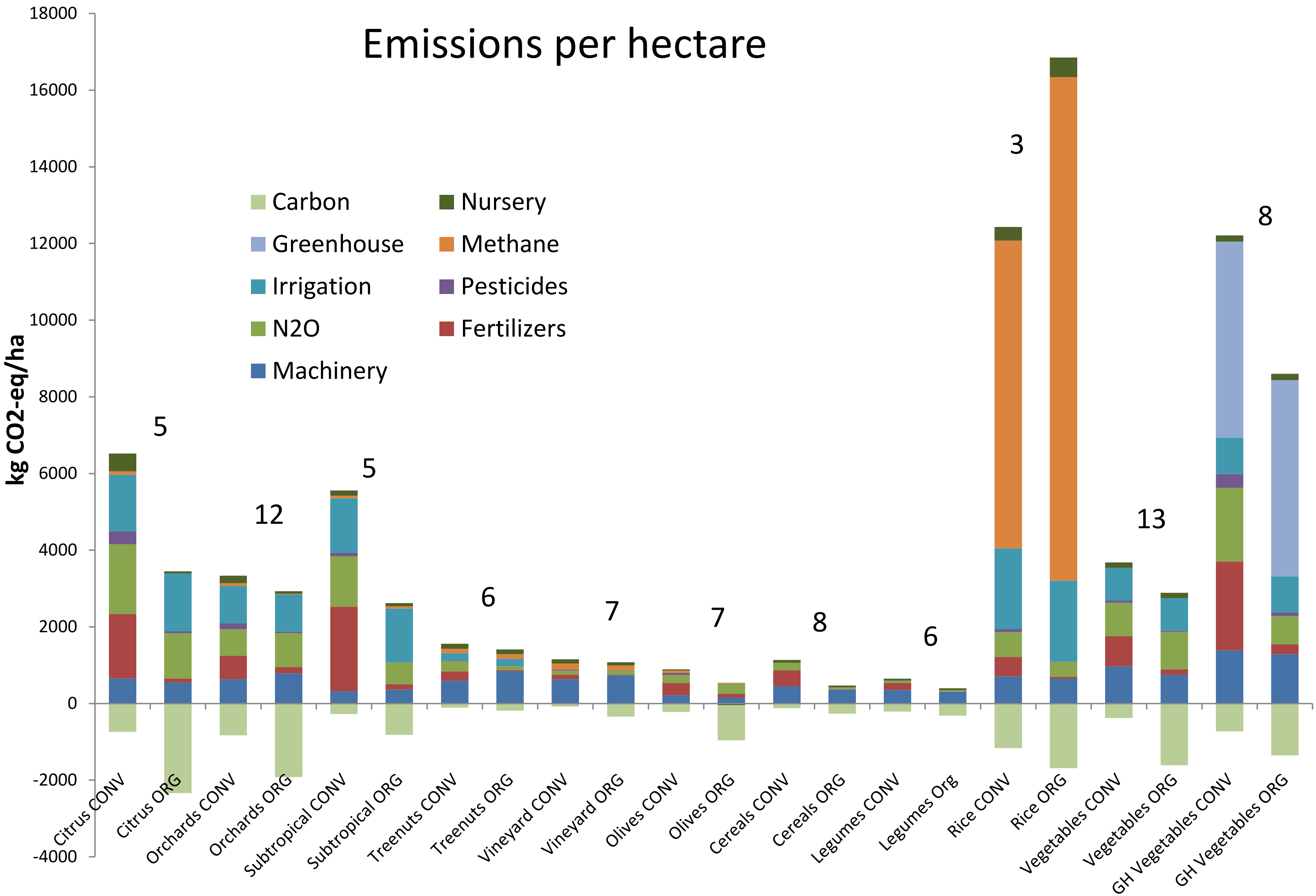
Sources: Aguilera et al., 2013b, others

Inventory analysis

- Input: total N applied
- Output: production

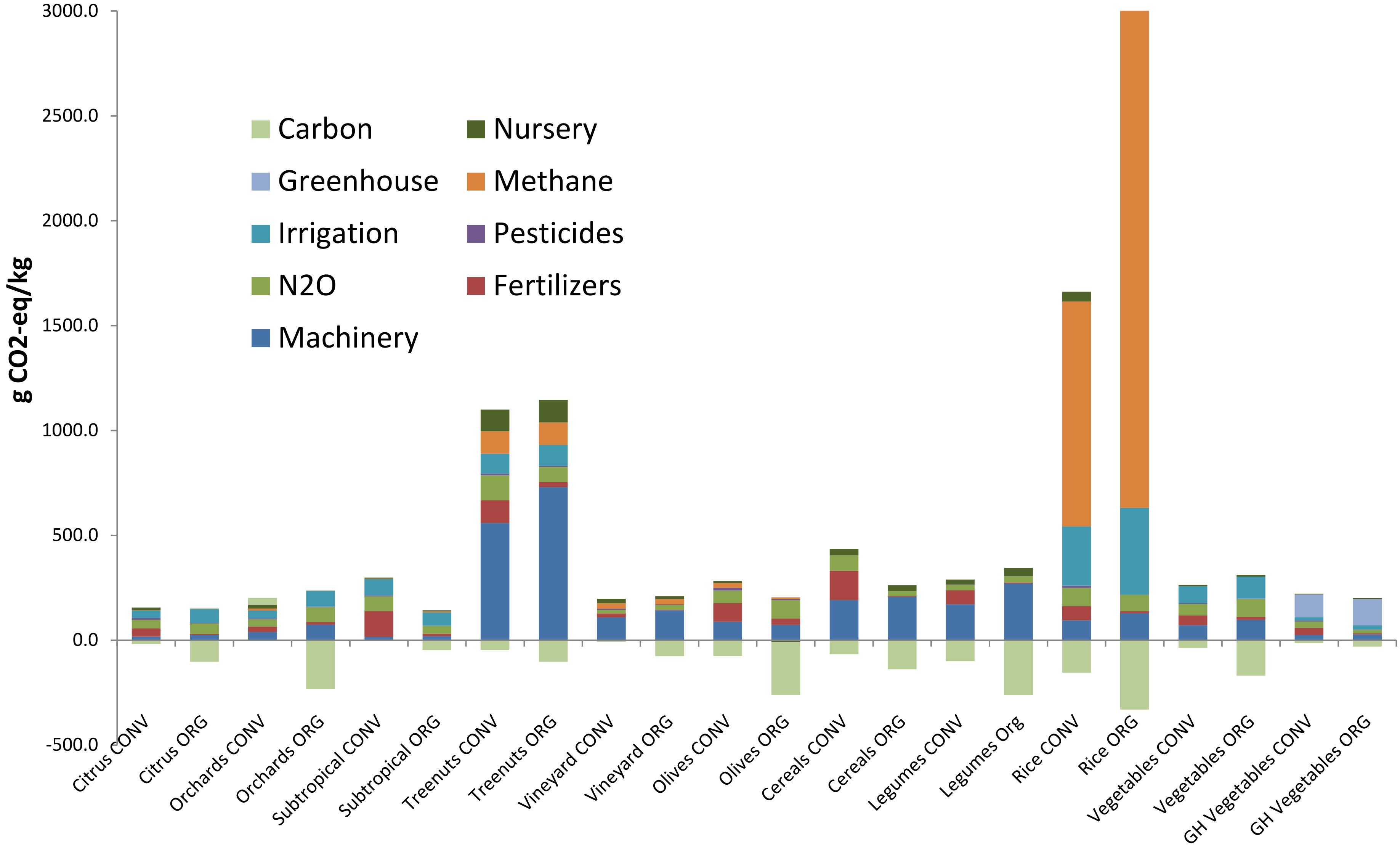




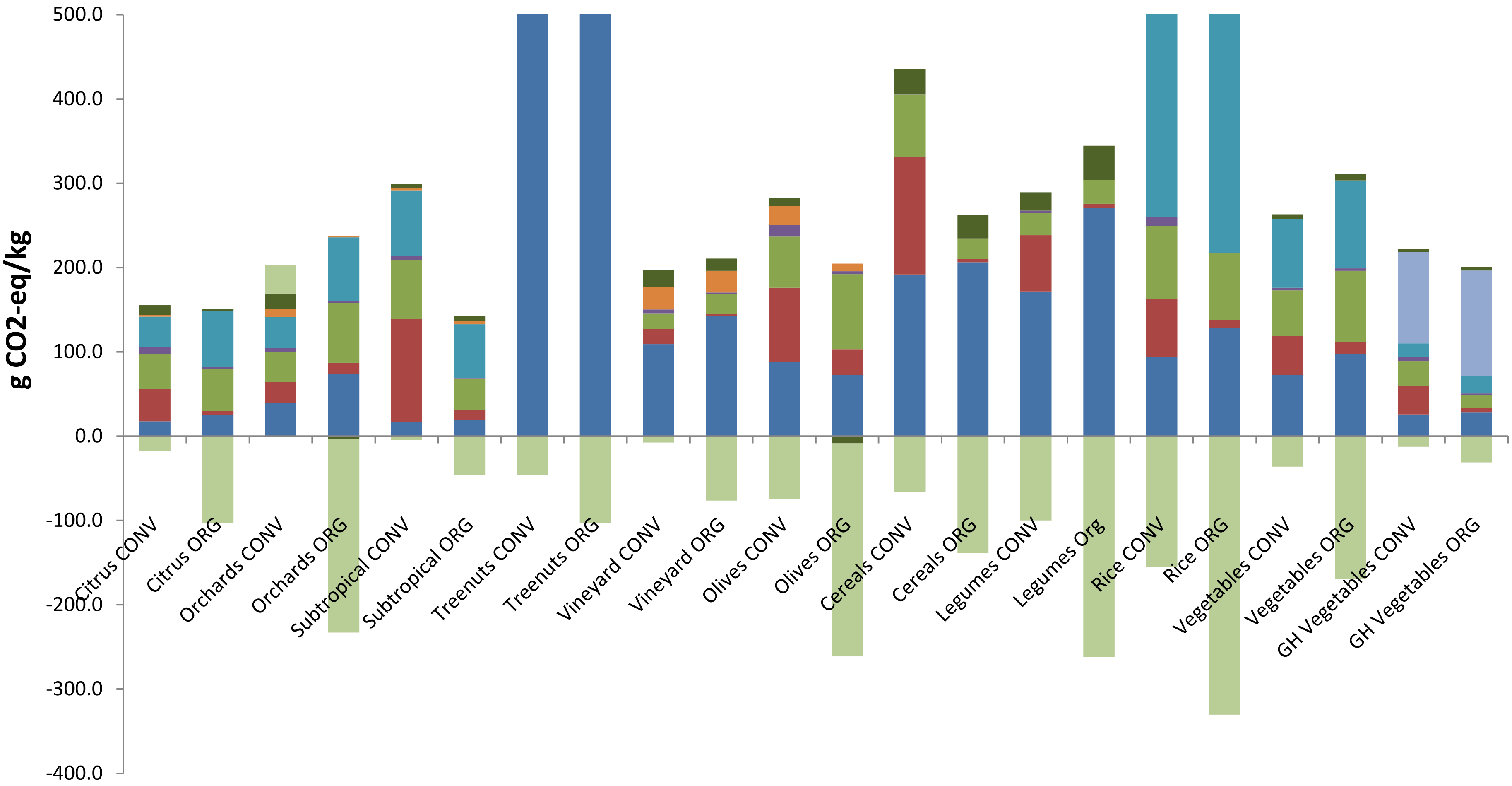


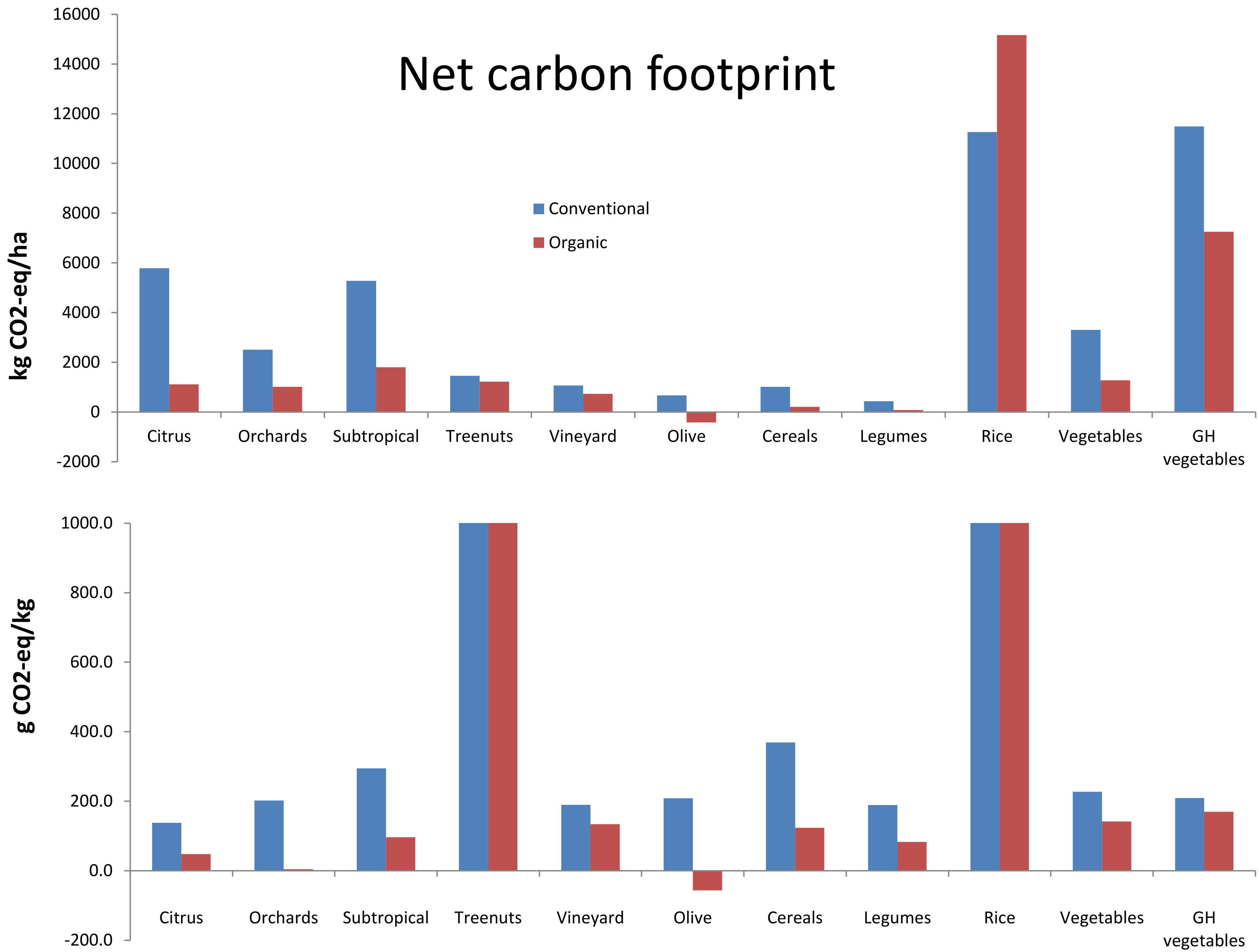
Emissions per hectare
kg CO2-eq/ha
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
-2000
-4000
Carbon
Nursery
Greenhouse
Methane
Irrigation
Pesticides
N2O
Fertilizers
Machinery
5
12
5
6
7
7
8
6
3
13
8
Citrus CONV
Citrus ORG
Orchards CONV
Orchards ORG
Subtropical CONV
Subtropical ORG
Treenuts CONV
Treenuts ORG
Vineyard CONV
Vineyard ORG
Olives CONV
Olives ORG
Cereals CONV
Cereals ORG
Legumes CONV
Legumes Org
Rice CONV
Rice ORG
Vegetables CONV
Vegetables ORG
GH Vegetables CONV
GH Vegetables ORG

Emissions per kg product



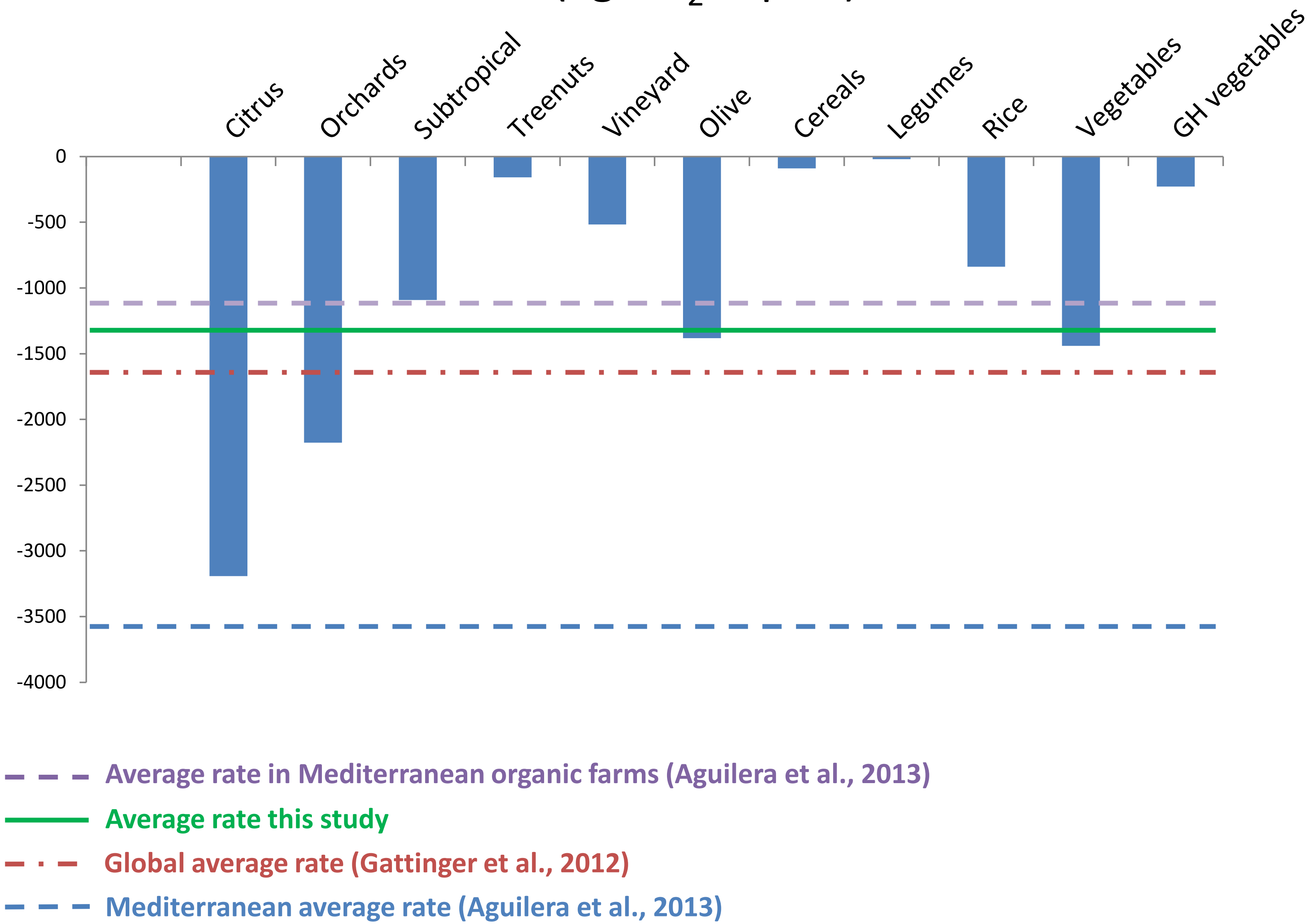
Emissions per kg product



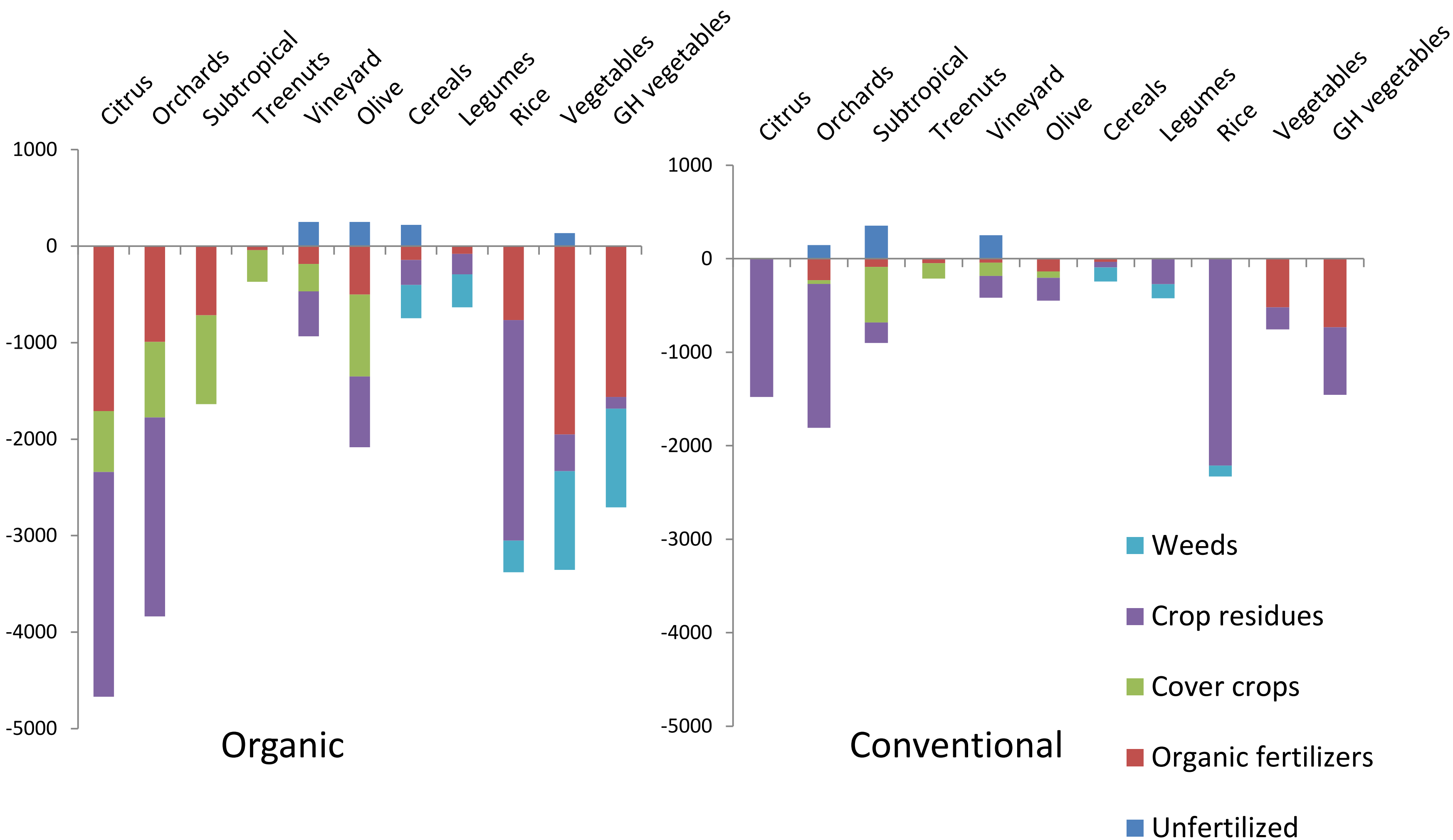


Net carbon footprint
Conventional
Organic
kg CO2-eq/ha
16000
14000
12000
10000
8000
6000
4000
2000
0
-2000
Citrus
Orchards
Subtropical
Treenuts
Vineyard
Olive
Cereals
Legumes
Rice
Vegetables
GH vegetables
g CO2-eq/kg
1000.0
800.0
600.0
400.0
200.0
0.0
-200.0
Citrus
Orchards
Subtropical
Treenuts
Vineyard
Olive
Cereals
Legumes
Rice
Vegetables
GH vegetables

Net carbon sequestration under organic management (Org-Conv) (kg CO_2-eq/ha)



Components of carbon sequestration (kg CO2-eq/ha)

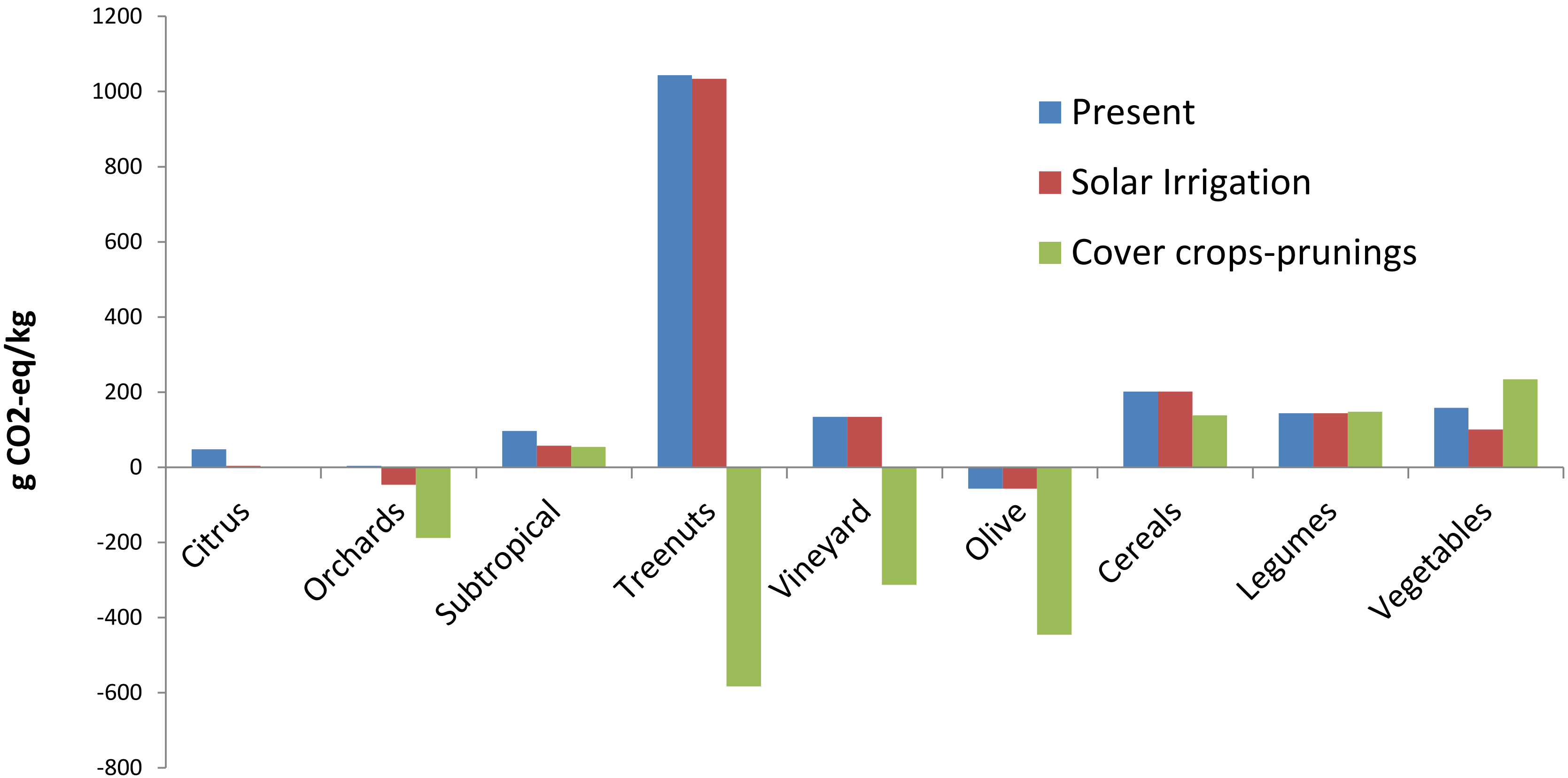


Conclusions

- Emissions are dominated by input production and on-farm fossil fuel use
- Lower emissions in organic systems due to lower input use and **higher C sequestration**
- Higher yields would improve carbon efficiency of organic systems
- High sequestration potential in woody crops

Future work: assessing the potential for climate change mitigation in Mediterranean organic cropping systems

Some preliminary results…



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www.historiambiental.org

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