Erosion risk assessment in olive orchards through a combined approach based in stakeholders, GIS and RUSLE

J.A. Gómez, A.M. Sánchez, M.A. Soriano, G. Guzmán

#EUsoil

ONLINE WORKSHOP ON
SOIL EROSION FOR THE EU
20 – 22 JUNE 2022 | JRC Ispra

European Commission

State of art

- Soil erosion is widely reckoned as a major threat in many agricultural systems.

State of art

- Soil erosion is widely reckoned as a major threat in many agricultural systems.
- There are different approaches to appraise soil water erosion at farm and field scale, most based on modelling.

State of art

- Soil erosion is widely reckoned as a major threat in many agricultural systems.
- There are different approaches to appraise soil water erosion at farm and field scale, most based on modelling.
- However, few farmers and technicians can identify and quantify by themselves the efficiency of control measures or the severity of the symptoms.

State of art

- Soil erosion is widely reckoned as a major threat in many agricultural systems.
- There are different approaches to appraise soil water erosion at farm and field scale, most based on modelling.
- However, few farmers and technicians can identify and quantify by themselves the efficiency of control measures or the severity of the symptoms.

Would be possible to provide a straightforward tool to help stakeholders in relatively large areas in appraising water erosion status at their farm/s?

How might scientists help?

Providing useful tools based in:

Scientific knowledge

RUSLE

How might scientists help?

Providing useful tools based in:

Scientific knowledge

RUSLE

Free and open source software

QGIS, ORUSCAL

Public and updated information

Sentinel, databases, Google, etc.

Farmers and technicians' feedback

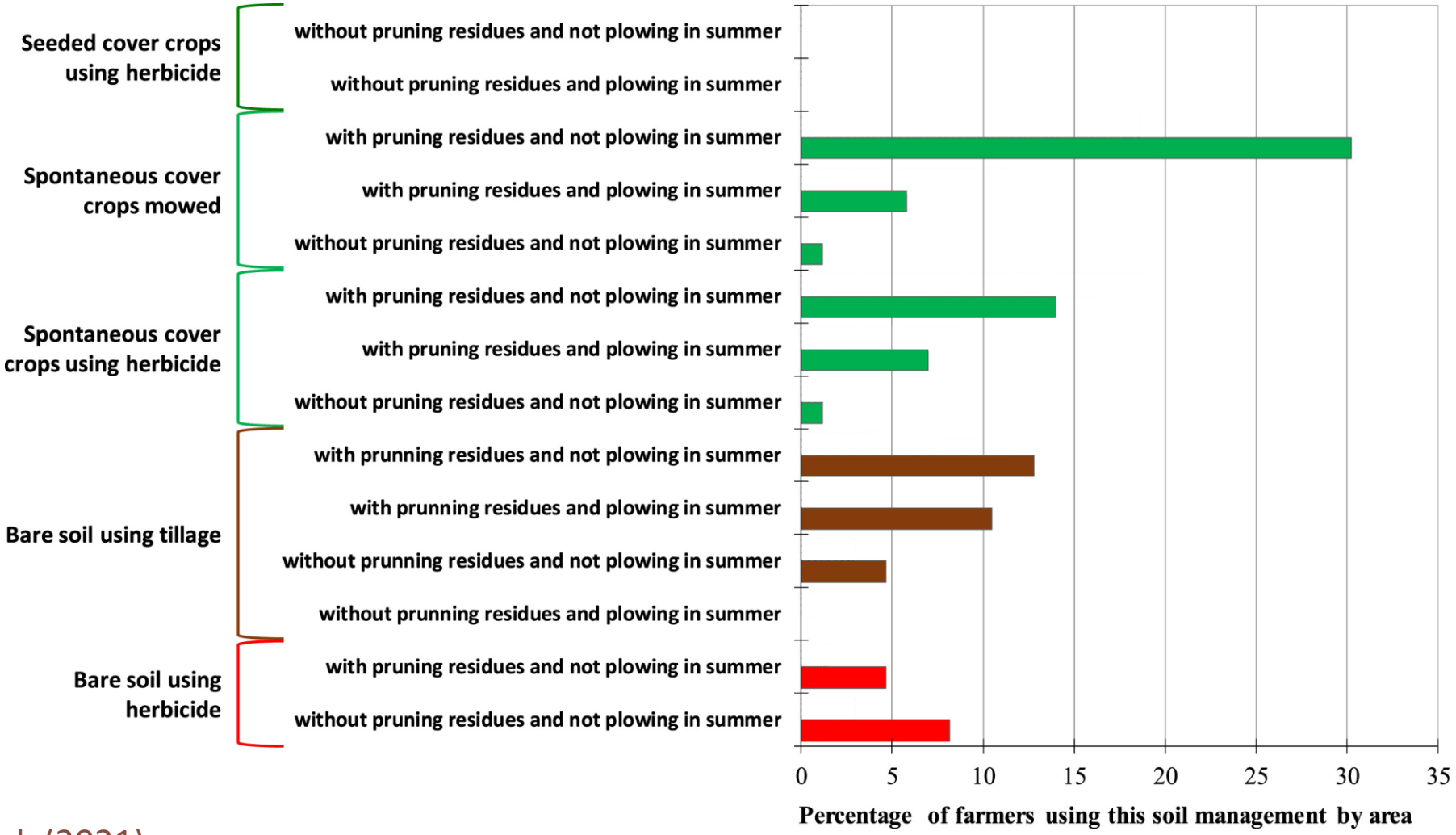
Detailed knowledge of the farms, periodic field visits

Pilot experience

DOP Estepa, cooperation since 2019, EIP-Agri

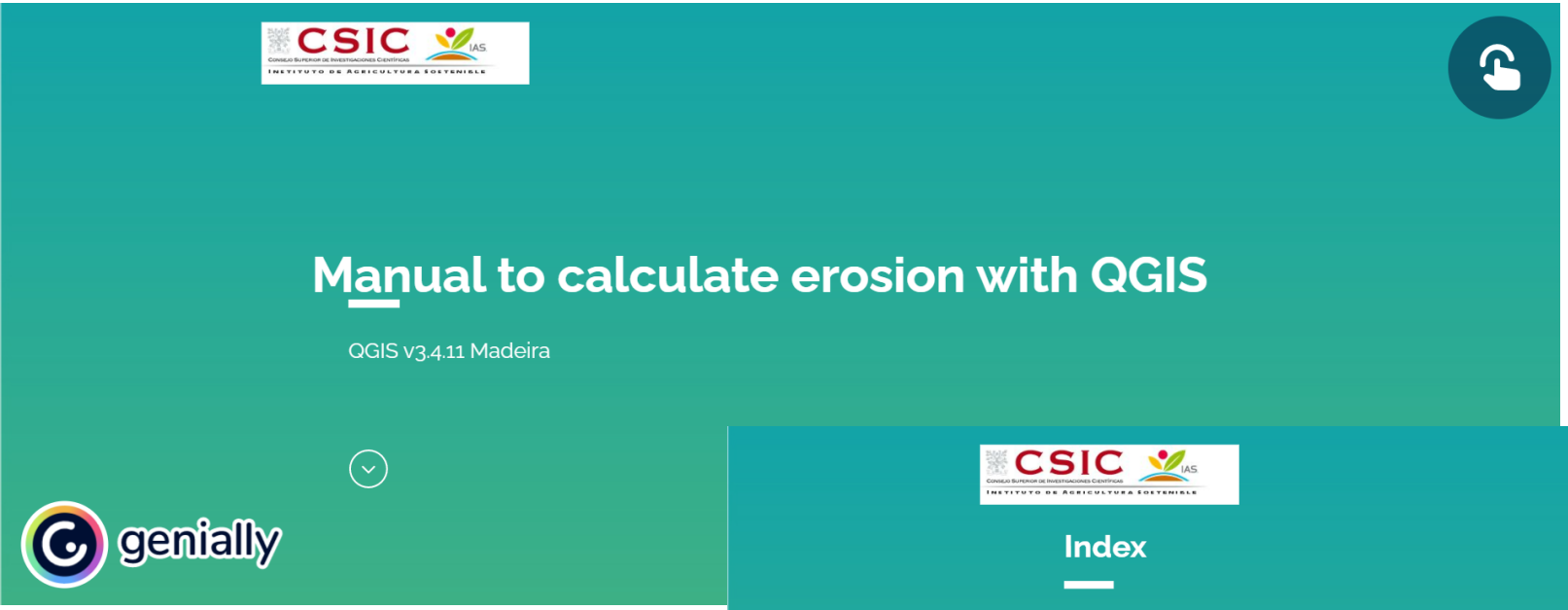
40,000 ha of olives under different soil management systems previously evaluated with stakeholders

Soil Managements



Gómez et al. (2021)

Guidelines to estimate soil erosion



Sánchez et al. (2020)

Revised Universal Soil Loss Equation

RUSLE2

$$A = R \times K \times LS \times P \times C$$

Revised Universal Soil Loss Equation

RUSLE2

$$A = R \times K \times LS \times P \times C$$

Available information in public archives

Revised Universal Soil Loss Equation

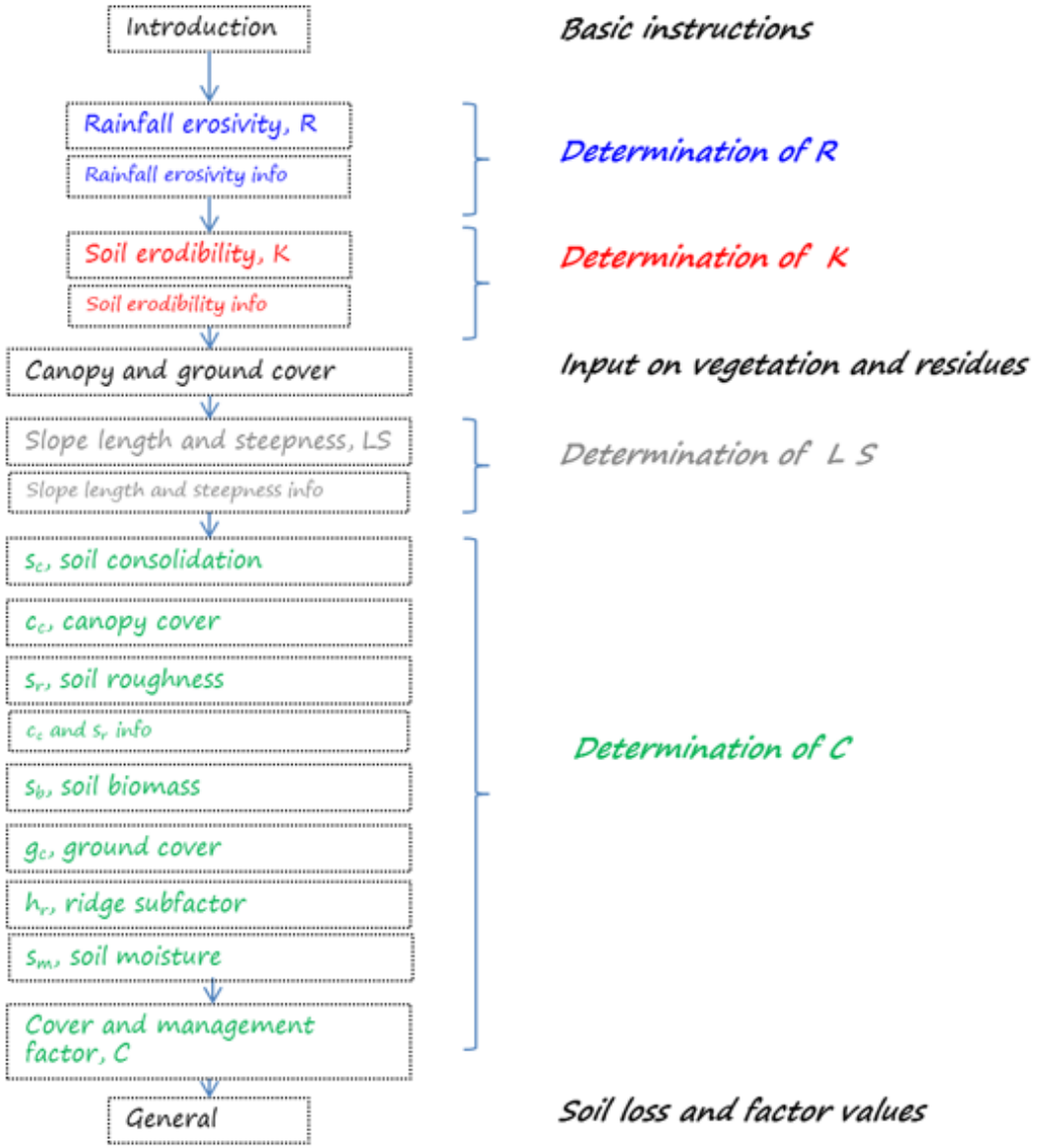
RUSLE2

$$A = R \times K \times LS \times P \times C$$

ORUSCAL
(Bidoccu et al., 2020; Gómez et al. 2020)

Estimation of C factor

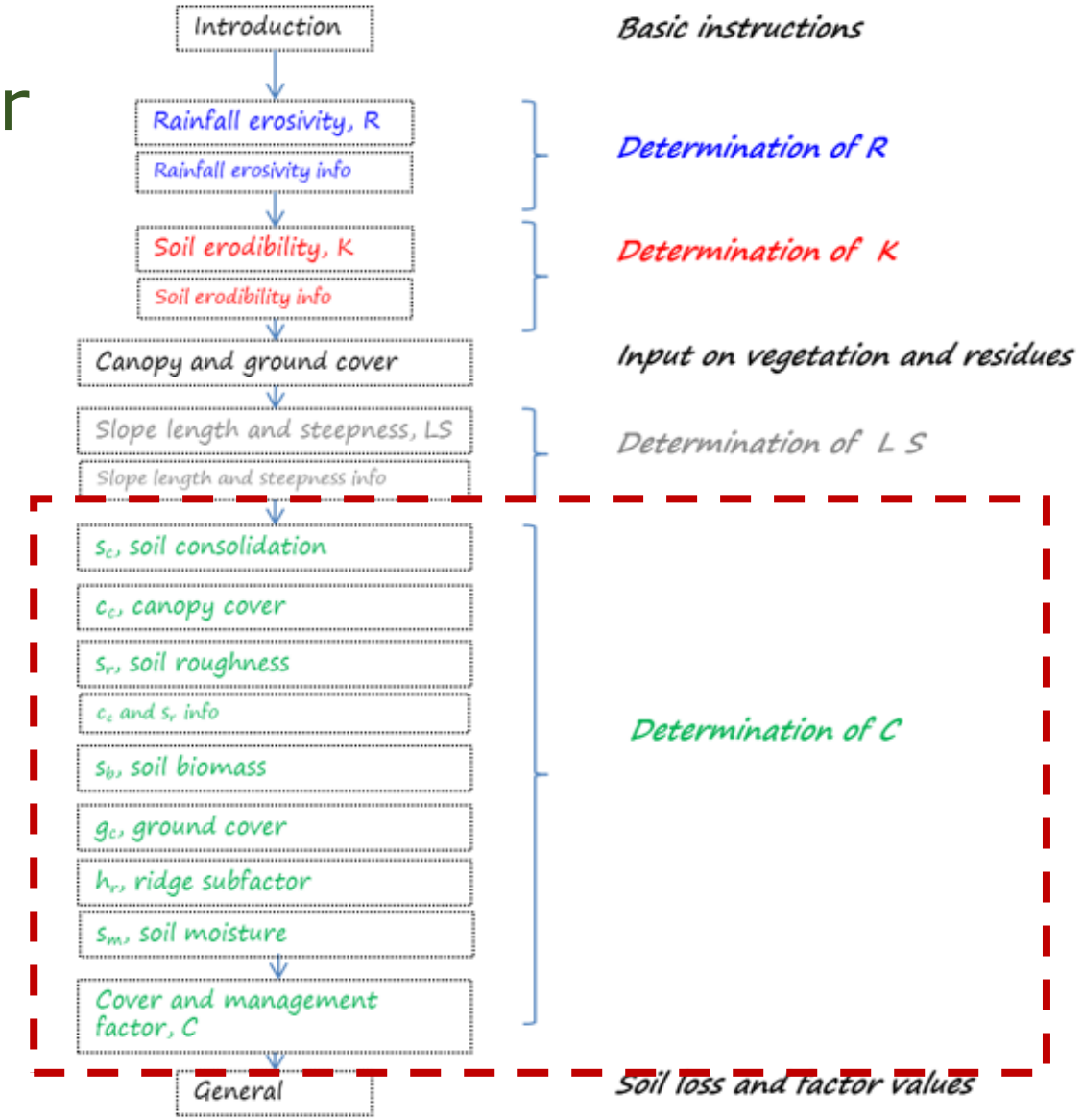
ORUSCAL
(Orchard RUSle
CALibration)



Gómez et al. (2020)

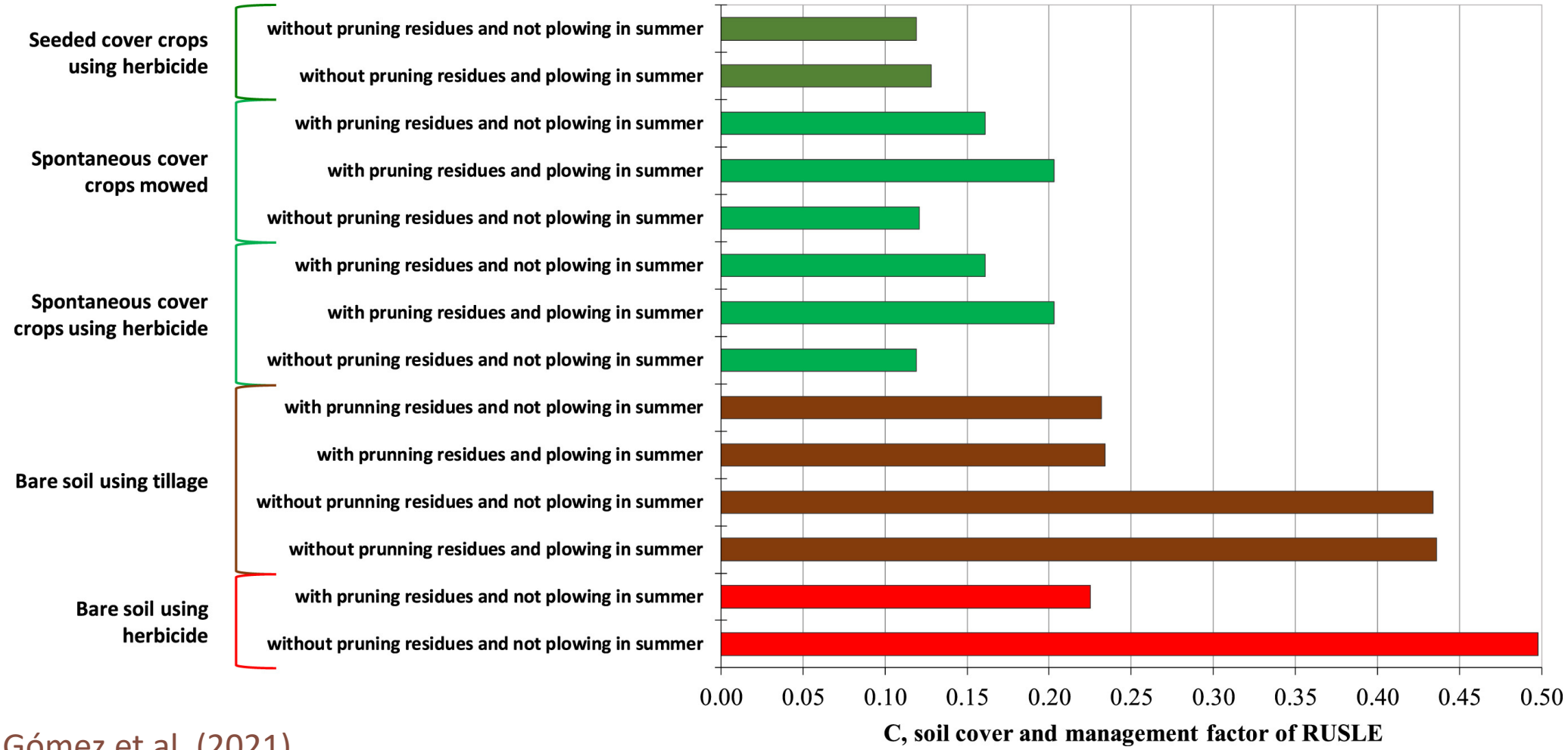
Estimation of C factor

ORUSCAL (Orchard RUSle CALibration)



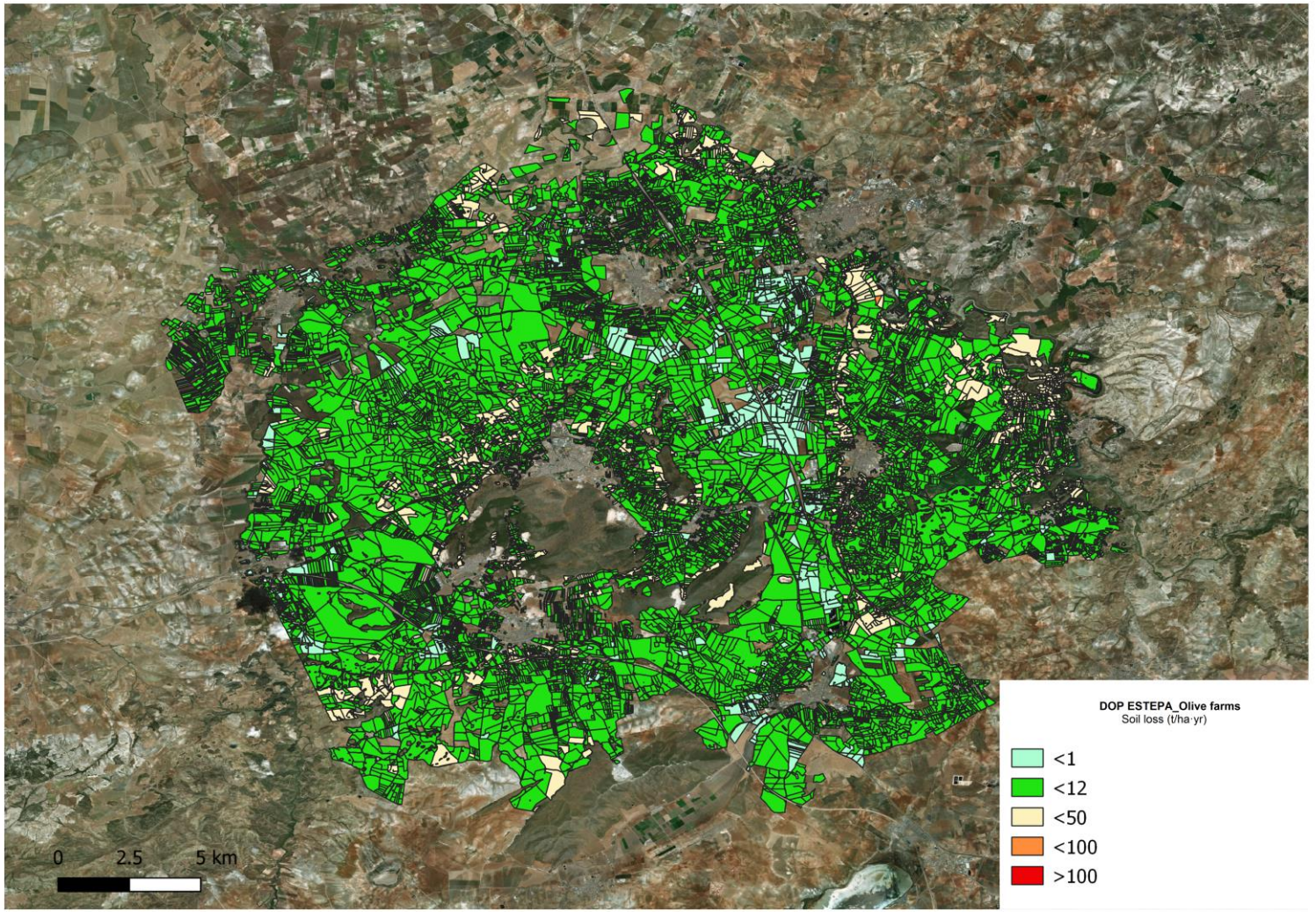
Gómez et al. (2020)

Estimation of C factor

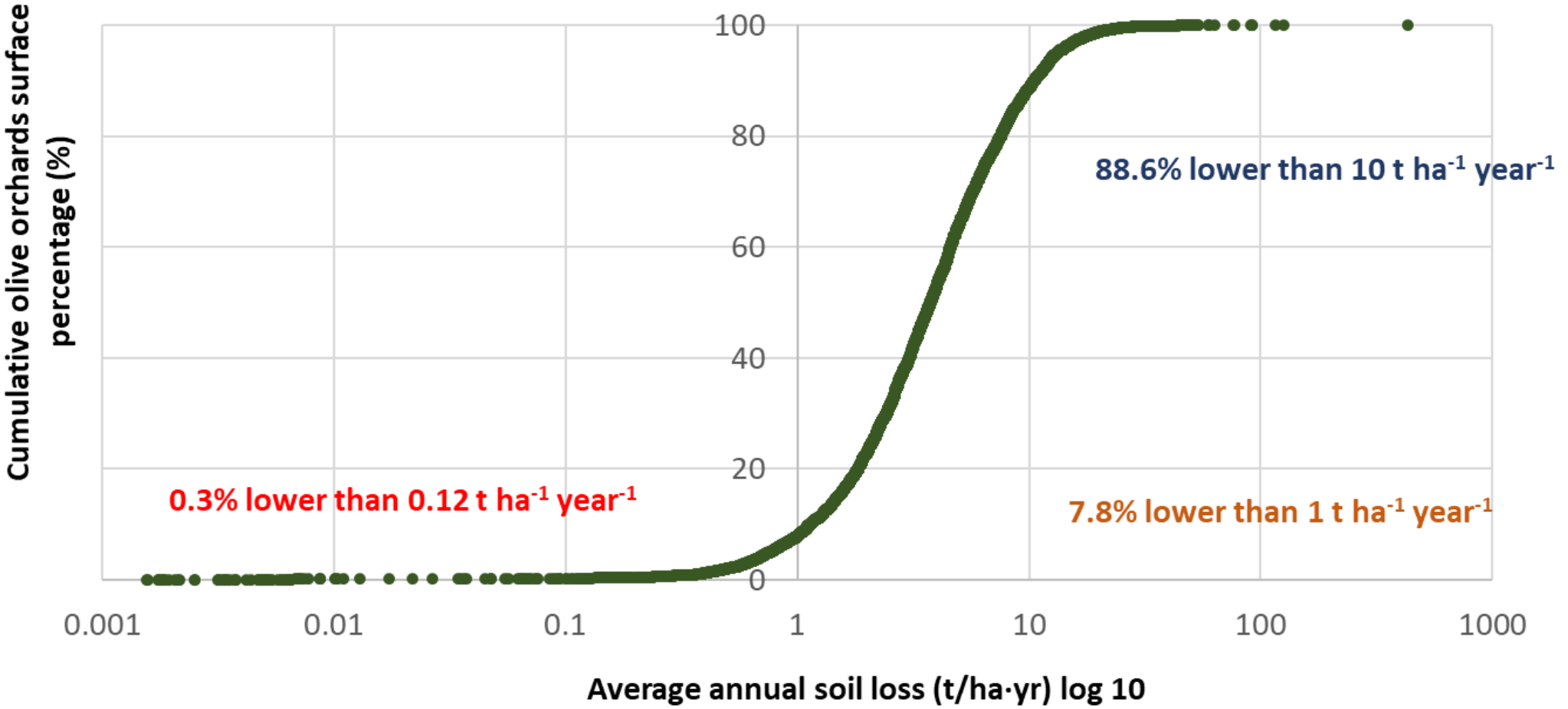


Gómez et al. (2021)

Soil loss at farm scale at the DOP Estepa



Soil loss at farm scale at the DOP Estepa



However, to improve the assessment…

Particularities of the management and symptoms at each farm should be considered.

VISUAL EVALUATION OF EROSION SYMPTOMS		Soil erosion risk		
		LOW	MEDIUM	HIGH
1. GENERAL RISK • Soil management • Ground cover • Slope and length • Semiterraces				
2. ON-FIELD CHECKING	• Compaction and surface crust			
	• Gullies and rills			
	• Ground cover			

Is necessary to complement it with on-field measurements.

Milgroom et al. (2006)

What's next?

- This tool allows knowing the annual soil losses at farm scale and identifying farms with a higher risk of erosion relying on their cadastral reference or spatial location.

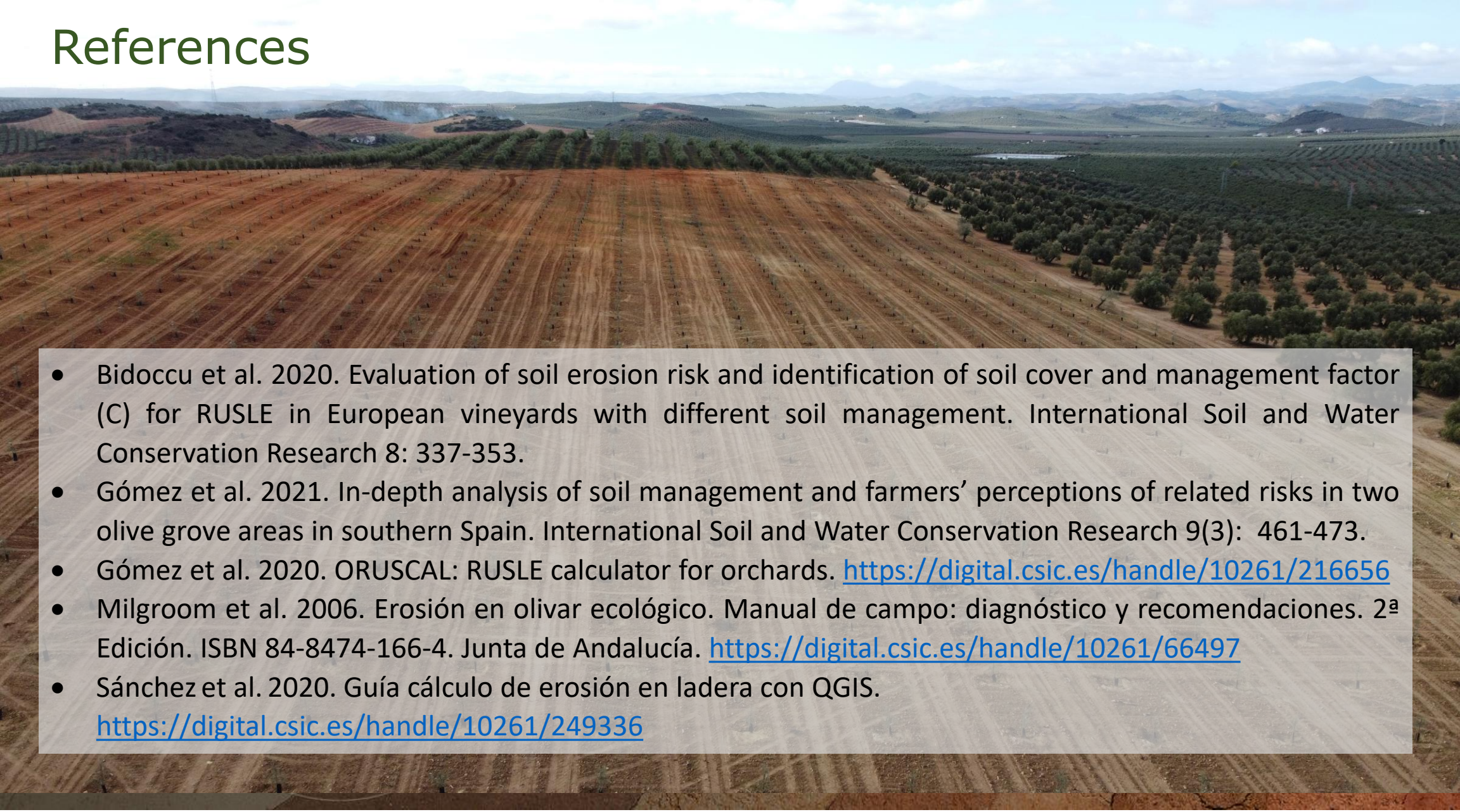
What's next?

- This tool allows knowing the annual soil losses at farm scale and identifying farms with a higher risk of erosion relying on their cadastral reference or spatial location.
- We keep on working on improving erosion predictions by optimizing different algorithms and the friendly presentation of maps on mobile devices. To be complemented with in-field evaluation by stakeholders using a standard, and tested, methodology.

What's next?

- This tool allows knowing the annual soil losses at farm scale and identifying farms with a higher risk of erosion relying on their cadastral reference or spatial location.
- We keep on working on improving erosion predictions by optimizing different algorithms and the friendly presentation of maps on mobile devices. To be complemented with in-field evaluation by stakeholders using a standard, and tested, methodology.
- This spatial database could be extended with other features of interest for farmers and technicians with an agronomic or environmental purpose.

References



- Bidoccu et al. 2020. Evaluation of soil erosion risk and identification of soil cover and management factor (C) for RUSLE in European vineyards with different soil management. International Soil and Water Conservation Research 8: 337-353.
- Gómez et al. 2021. In-depth analysis of soil management and farmers' perceptions of related risks in two olive grove areas in southern Spain. International Soil and Water Conservation Research 9(3): 461-473.
- Gómez et al. 2020. ORUSCAL: RUSLE calculator for orchards. https://digital.csic.es/handle/10261/216656
- Milgroom et al. 2006. Erosión en olivar ecológico. Manual de campo: diagnóstico y recomendaciones. 2ª Edición. ISBN 84-8474-166-4. Junta de Andalucía. https://digital.csic.es/handle/10261/66497
- Sánchez et al. 2020. Guía cálculo de erosión en ladera con QGIS. https://digital.csic.es/handle/10261/249336

Thanks for your attention

gemaguzmandiaz@ias.csic.es

#EUsoil