



UNIVERSITÀ DEGLI STUDI DI MILANO

DIPARTIMENTO DI SCIENZE AGRARIE
E AMBIENTALI - PRODUZIONE,
TERRITORIO, AGROENERGIA



“Effect of conservation agriculture on soil organic carbon sequestration in Mediterranean region. A systematic map”



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INTRODUCTION



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Can conservation agriculture increase soil carbon sequestration? A modelling approach

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Commentary

Tillage and soil carbon sequestration—What do we really know?

John M. Baker^{a,b,*}, Tyson E. Ochsner^{a,b}, Rodney T. Venterea^{a,b}, Timothy J. Griffis^b

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PURPOSE OF THE WORK:

- Studying the C dynamics (0-30 cm layer) on **conservation agriculture** with all the 3 principles together;
- Get conclusions within **Mediterranean/temperate** climate;
- Create a reliable C data **extraction method**;
- Conduct a **robust meta analysis** on the interaction between production factors (tillage, soil coverage, N etc.).

Huge amount of **Carbon** data from field experiments in conservation agriculture.

↓

How do we can **quantitatively summarize** the results?

?

META-ANALYSIS

Scopus®

+



QUERY composition:

3 principles conservation agriculture (CA)
+ soil organic carbon
+ conventional tillage
+ countries

885 articles found

Filtered
by

The 885 articles were further selected by:

Köppen climate

Presence of C data

Presence of the comparison no till vs conventional till

+ definition of the CTRL and TREATMENT

DATA EXTRACTION PRACTICAL TOOLS:

- Tool for the assessment of the **Köppen climate** from an article geographical coordinates;
- Tool for the extraction of **missing standard deviation data**;
- Definition of a **matemathical method** to estimate the **standard deviation** of a product (C% * BD) or a sum (C soil layers).

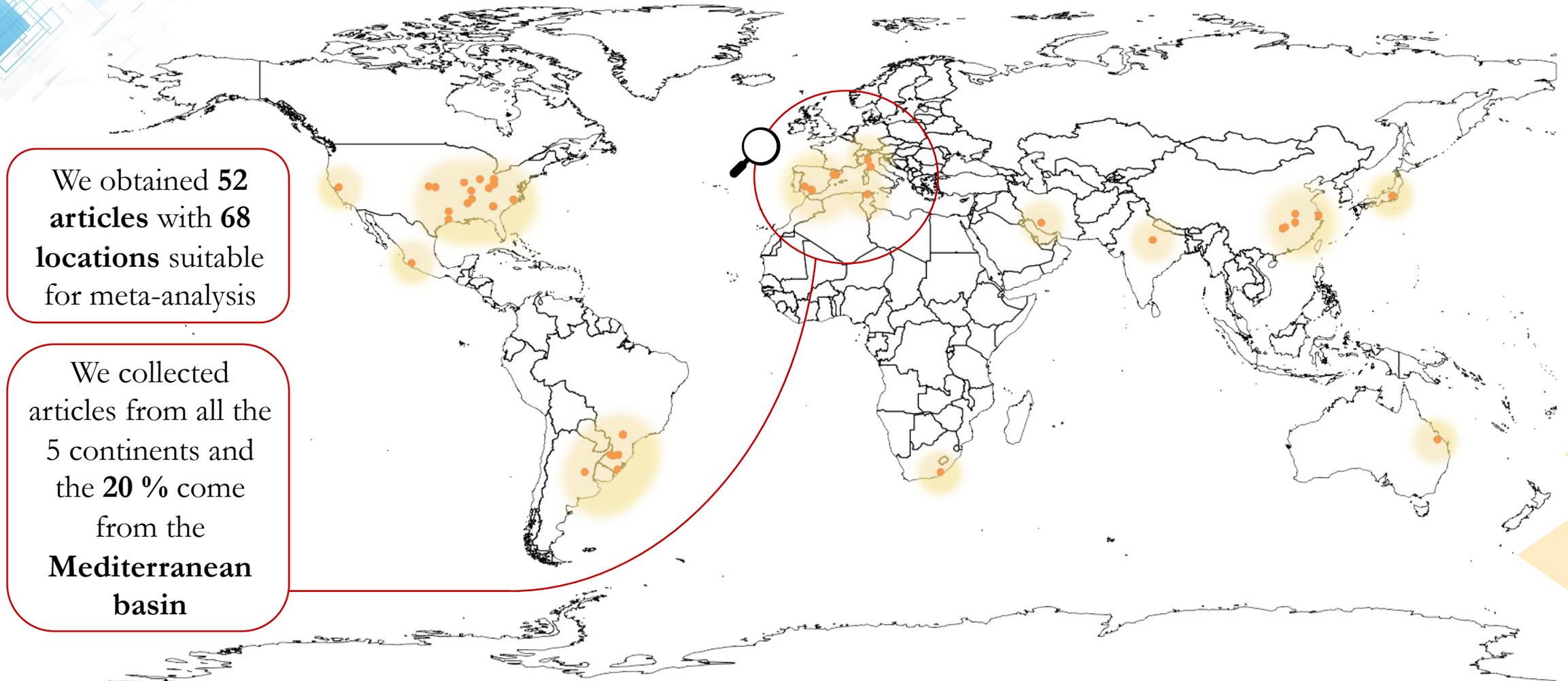


Fig 1. Red points represent the 68 locations suitable for meta-analysis.

Categorical explanatory variables
Climate (Köppen classification)
Presence of the 3 conservation agr. principles
Crop diversification (3 or more)
Cover crop presence
Crop residue
Experiment duration
Soil texture
Geographical continent
Soil layers
Continuous explanatory variables
N fertilization
Annual rain
Clay content

- **Köppen climate:** 72% Cfa, 25% Csa, 2% Csb;
- 60 % of the articles report **stock** (t C ha⁻¹) value;
- 14 % of the experiments have treatments with all the **3 conservation agriculture principles**;
- 73 % of the experiments have at least one **high residue crop** in the rotation;
- 79 % of the experiments are long term experiment (**LTE**);
- **Countries:** USA 41%, Spain 17%, Brazil 14%, China 11%, Italy, Japan 3% and Argentina, Australia, India, Iran, Mexico, South Africa, Tunisia 1%.

The definition of a organized database and the modality to interpret the data will be used to performed a meta-analysis on the soil organic carbon in conservation agriculture.

Fig 2. Categorical and continuous variable used to analyse the database.