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Mapping soil a network analysis biodiversity research: approach

INTRODUCTION

- Soil biodiversity research is attracting an increasing attention on the scientific community
 due to its relationships with soil erosion, soil desertification, soil productivity and in
 general to all natural and anthropic processes triggering a changing environment
- Several publications have been published having as a subject soil biodiversity. In particular soil biodiversity research correlates very well with multifunctional and multidisciplinary research as well as with specific and thematic ones
- So, by analyzing published research in soil biodiversity subjects stored in international bibliometric databases is possible to carried out an overall research overview of the topic
- Science mapping is a spatial representation of how disciplines, fields, specialties, documents, and authors are related to one another and aims at displaying the structural and dynamic aspects of a particular research field
- This approach has been already applied to several research fields, i.e. **biodiversity** (Liu et al. 2011), **remote sensing** (Zhuang et al. 2013), **climate engineering** (Belter and Seidel 2013), **renewable energies** (Rizzi et al. 2014), **precision agriculture** (Pallottino et al. 2018), **carbon storage** (Karimi and Khalilpour 2015), **forest management** (Di Matteo et al. 2017)



STUDY RATIONALE AND OBJECTIVES

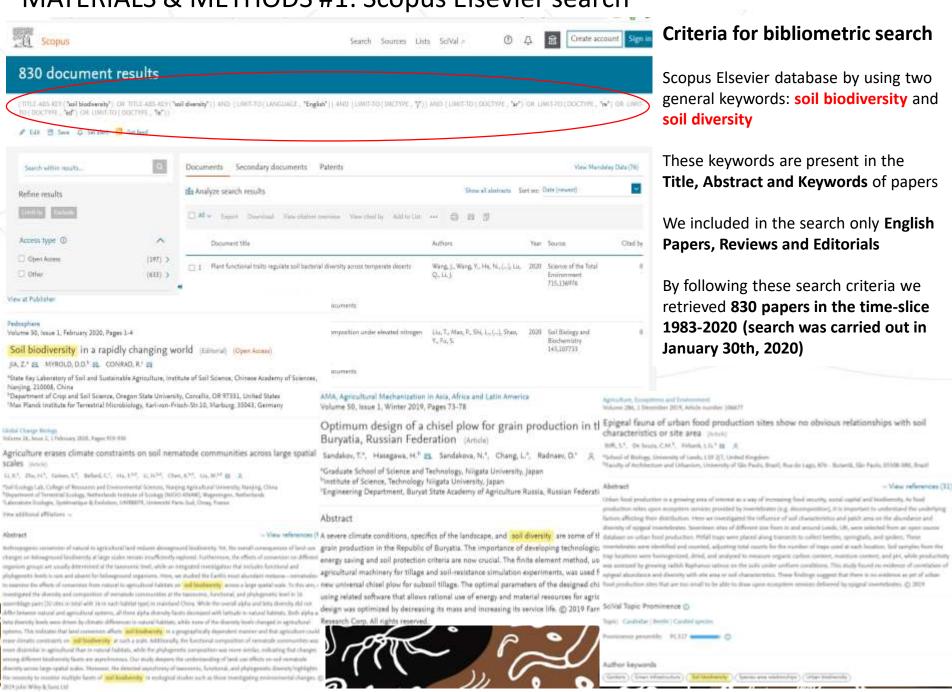
To perform a science mapping approach as an explanatory analysis in soil biodiversity research to get its overall overview in terms of published research and topics investigated

Specific objectives are devoted to answer the following research questions:

- (i) How the **soil biodiversity research field** is represented in terms of the **most commonly occurring research terms and how they are inter-related**?
- (ii) Which was the most relevant **research terms** in terms of **co-cited papers**?



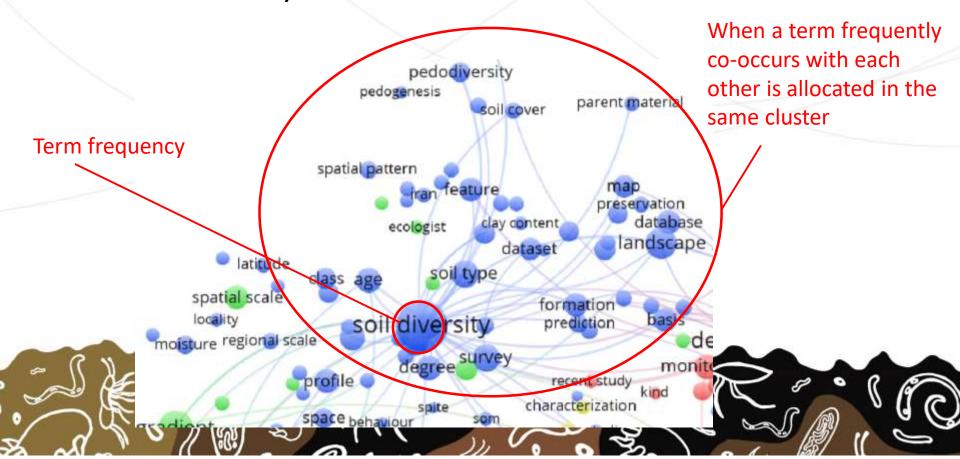
MATERIALS & METHODS #1: Scopus Elsevier search



MATERIALS & METHODS #2: VosViewer clustering

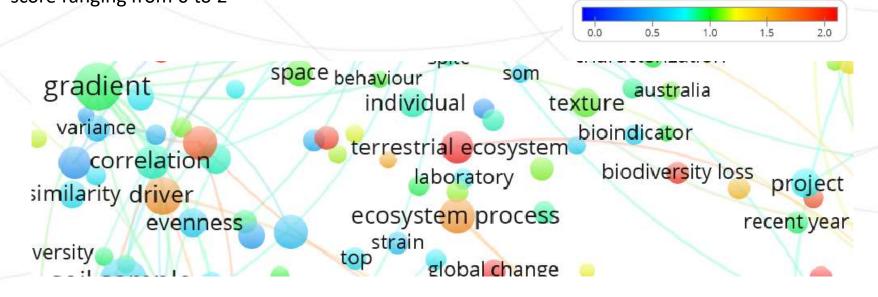
- VosViewer software was used for **clustering research terms** based on their co-occurrences and co-citation (www.vosviewer.com Visualization of Similarities)
- Co-occurence term and co-cited term maps were produced

<u>Co-occurrence term map:</u> strongly related terms are located close to each other and less strongly related terms are located further away from each other



MATERIALS & METHODS #3: VosViewer clustering

<u>Co-cited term map:</u> average citation impact of the publications in which the term occurs. To avoid bias related to the age of a publication, the number of citations it received is divided by the average number of citations of all publications appearing in the same year. This produces a publication's normalized citation score ranging from 0 to 2



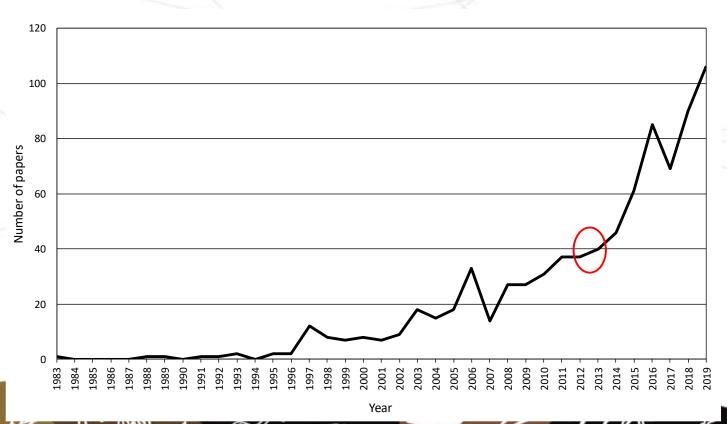
More methodological info on VosViewer software are available on van Eck and Waltman 2010. Scientometrics 84(2), 523–538



RESULTS #1: increasing trend in publishing soil biodiversity papers

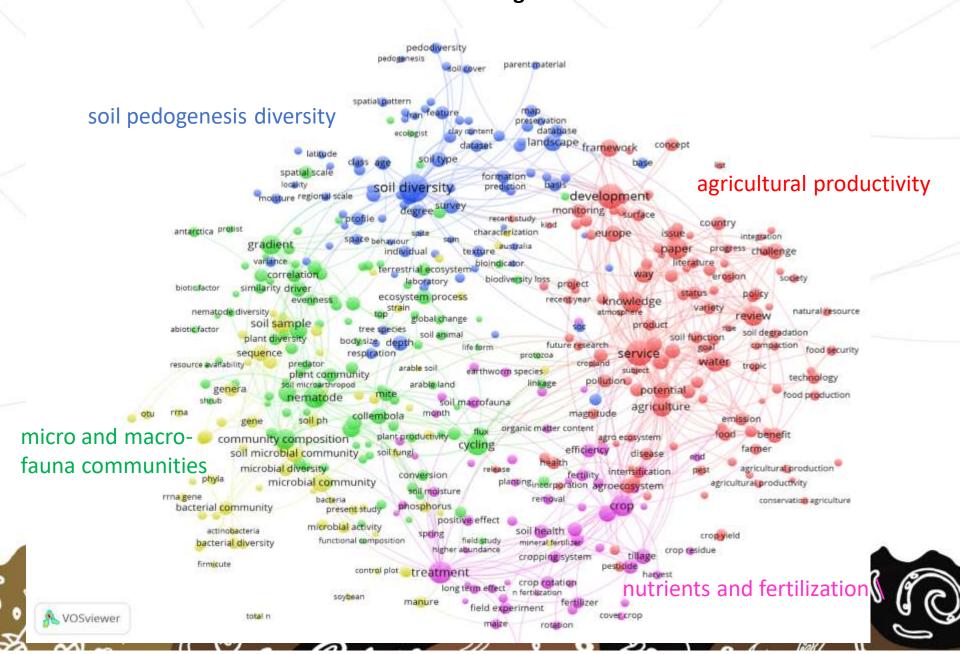
Increasing trend in publishing ISI papers in soil biodiversity and soil diversity subjects in the timeslice 1983-2019

This increase was particularly evident since 2012 and peaking in 2019 with more one hundred papers

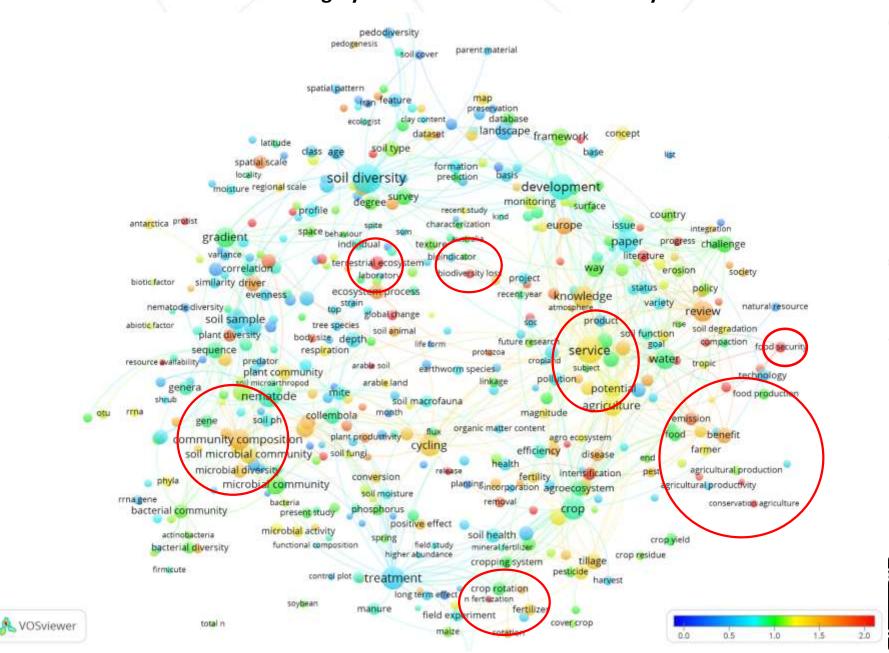


RESULTS #2: Co-occurence term map. Four clusters related to soil biodiversity research.

Intra- and inter-connections among clusters



RESULTS #3: Co-cited term map. Several cited research terms across the research area and four clusters. Highly cited research terms are evenly distributed across clusters



CONCLUSIONS

Through the analysis of 830 papers published from 1983 to 2020 (January), we concluded the following:

- i) Number of papers in soil biodiversity research field increased exponentially since 2012 among the English-language literature
- ii) Soil pedogenesis diversity, agricultural productivity, nutrients and fertilization and micro- and macro animal communities represent well-defined research topics, characterizing the soil biodiversity research field
- iii) Research related to "conservation agriculture", "food security", "emission", "agriculture intensification", "global change", "terrestrial ecosystem", "soil microbial community", "biodiversity loss" generally received much more citations over time

METHODOLOGY IMPROVEMENTS

(i) arbitrary keywords' choice of the primary search and (ii) presence of synonyms and homonyms



THANK YOU FOR YOUR ATTENTION!

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