



# Coniugare conoscenza e innovazione per ripristinare gli equilibri trofici e la salute del sistema suolo - pianta

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With contribution of A. Agnelli, C. Marzadori, A. Zamboni, L. Guidi, A. Castagna, M. Abenavoli

A cura di SICA, SIPE e SISS

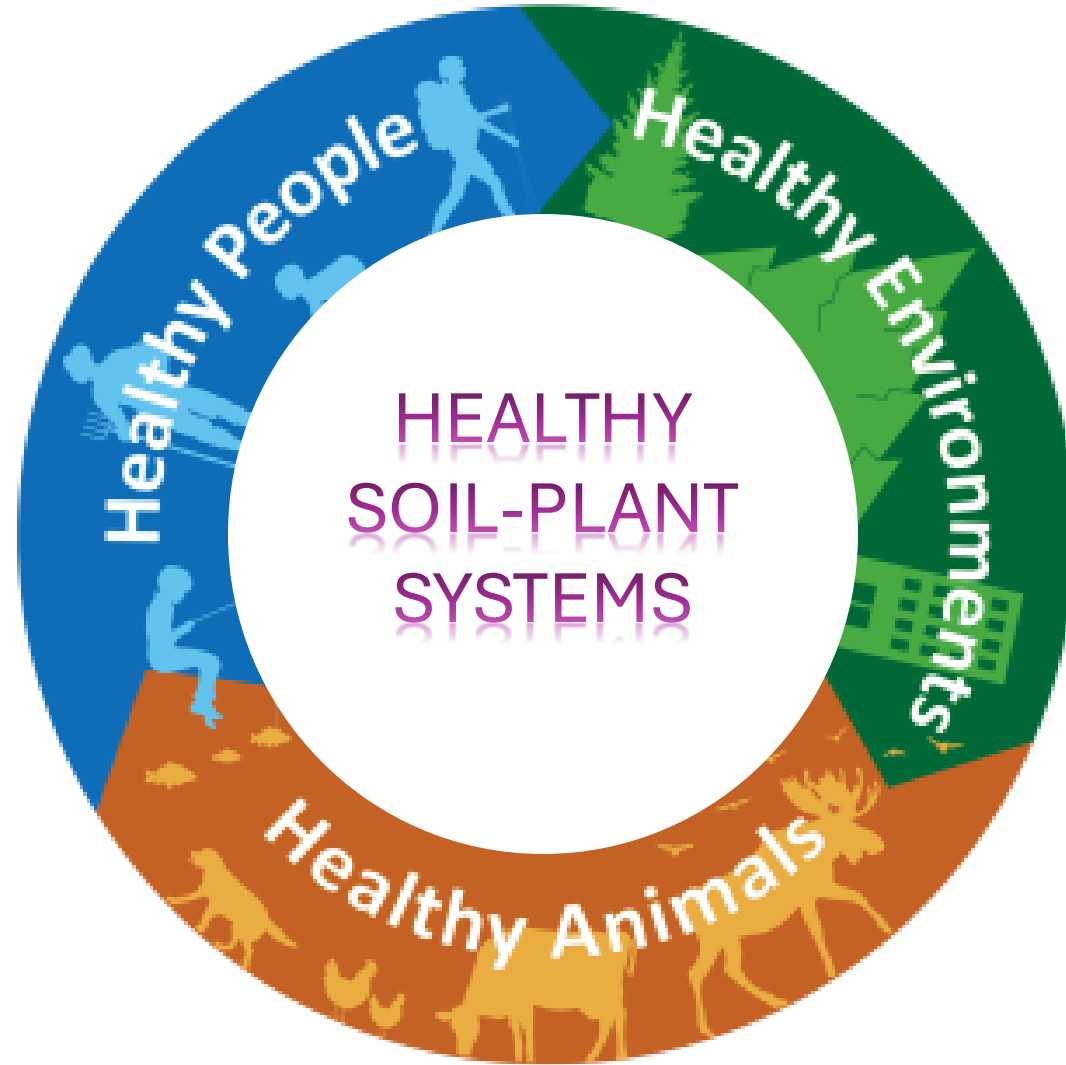


**UNIVERSITÀ  
DI TORINO**

# ONE HEALTH



# SOIL-PLANT HEALTH



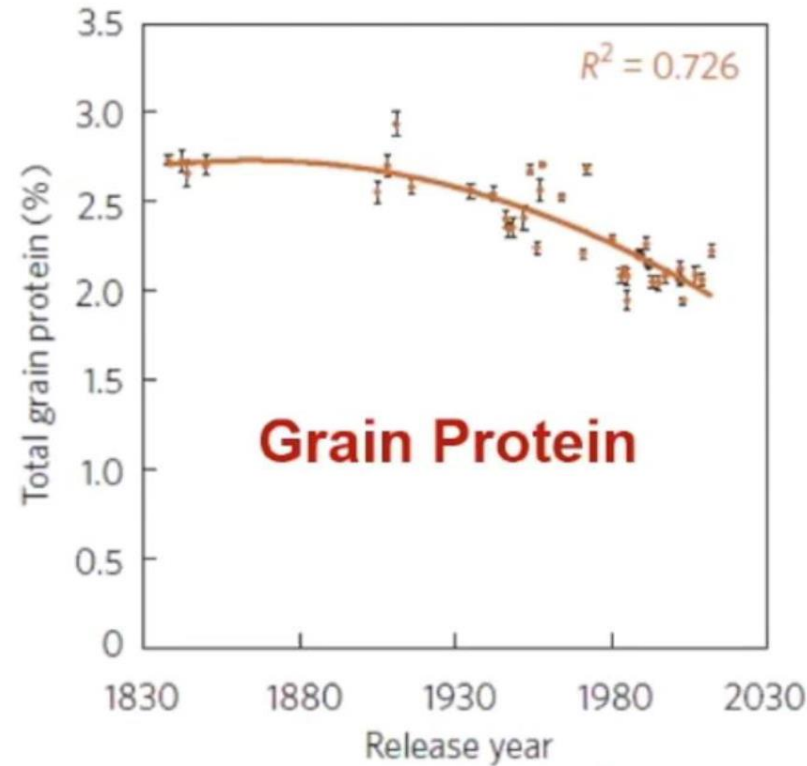
# SOIL HEALTH



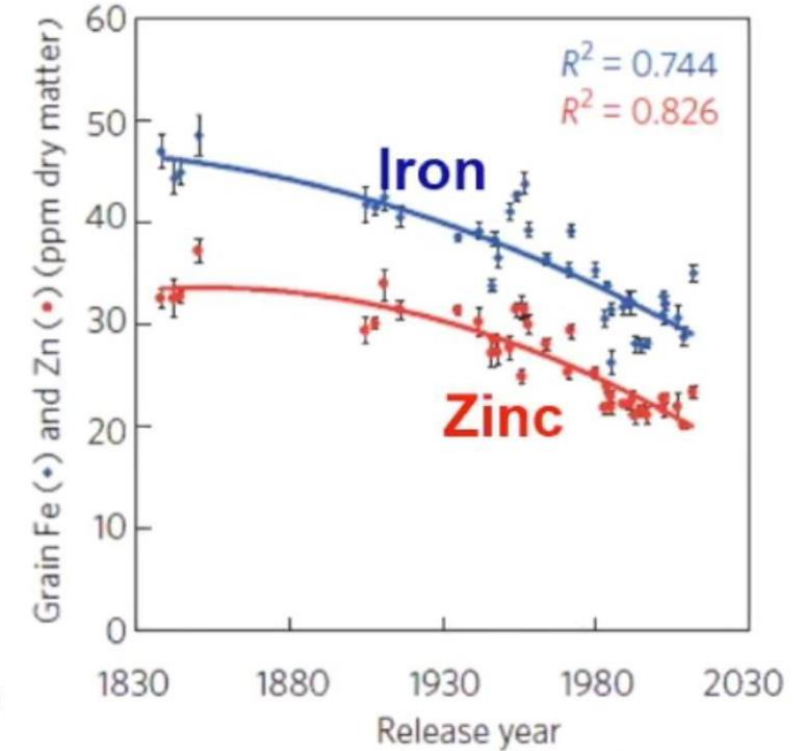
# CROP HEALTH

Percentage of soils deficient in nutrients

| Element | %  |
|---------|----|
| N       | 85 |
| P       | 73 |
| K       | 55 |
| B       | 31 |
| Cu      | 14 |
| Mn      | 10 |
| Mo      | 15 |
| Zn      | 49 |



  
**Years**



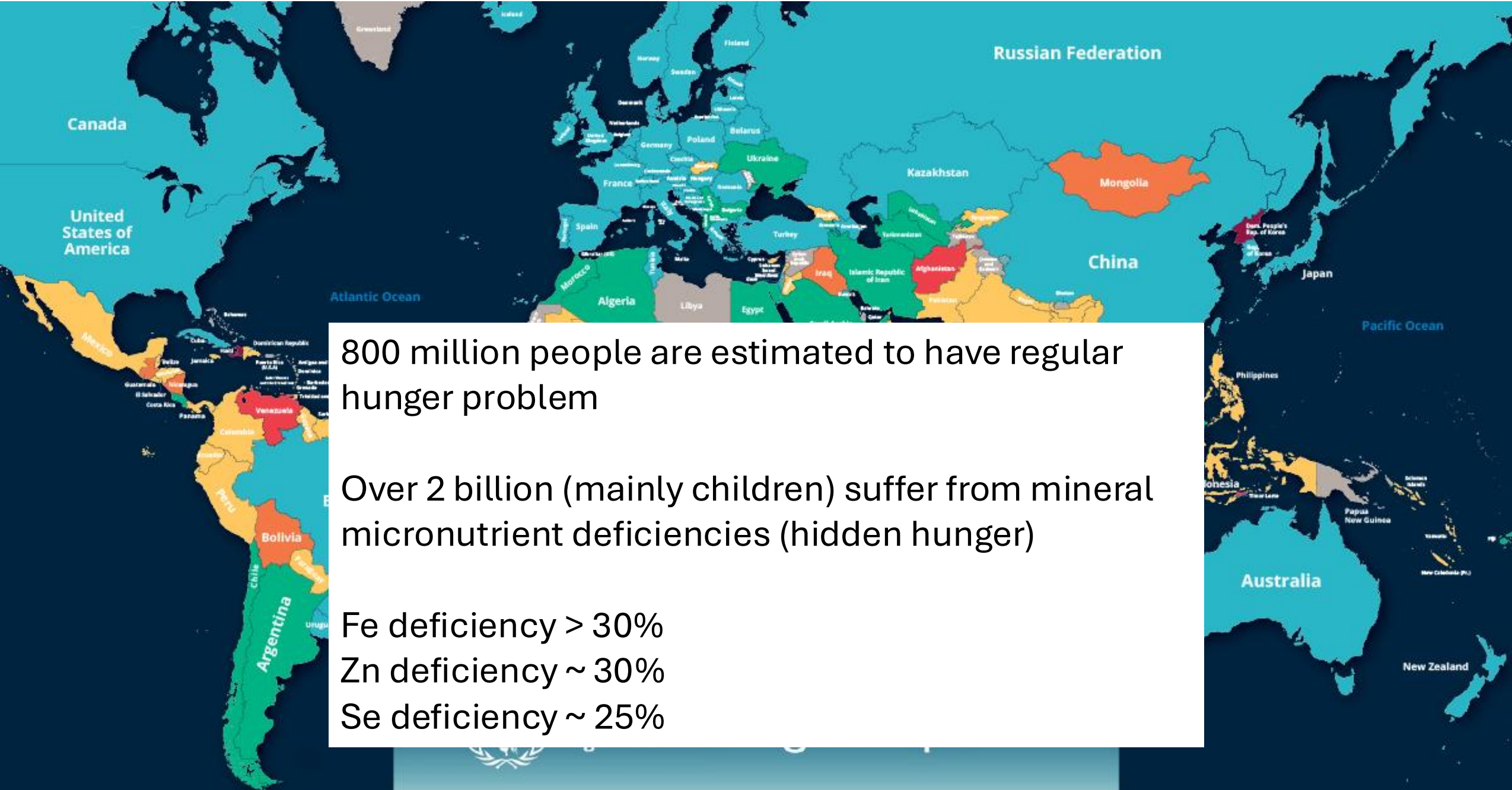
  
**Years**

(Shewry et al. 2016)



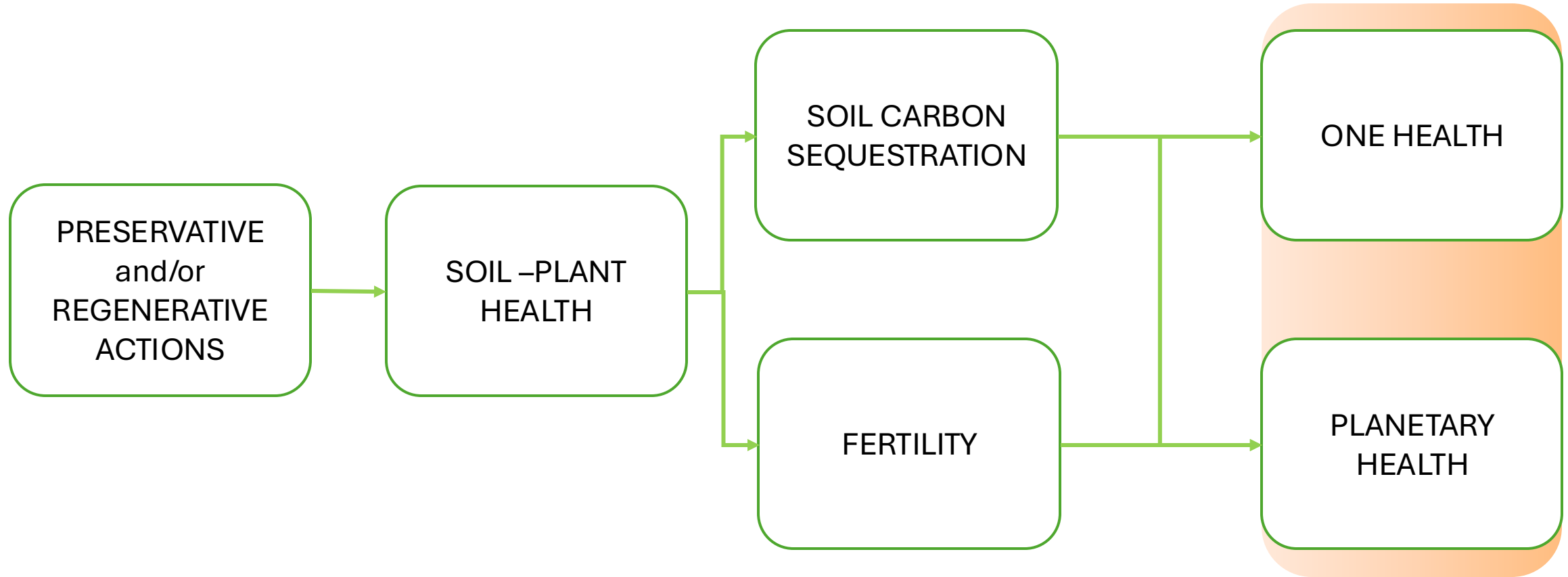
# HUMAN HEALTH









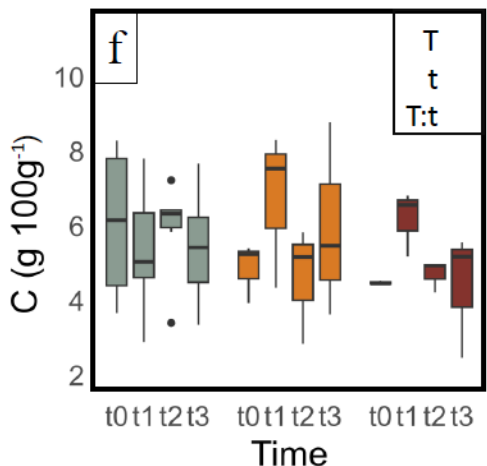
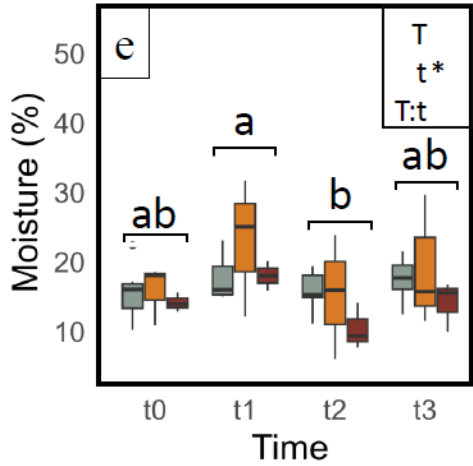
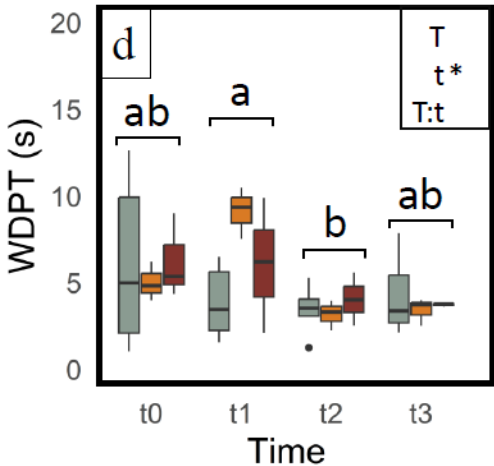




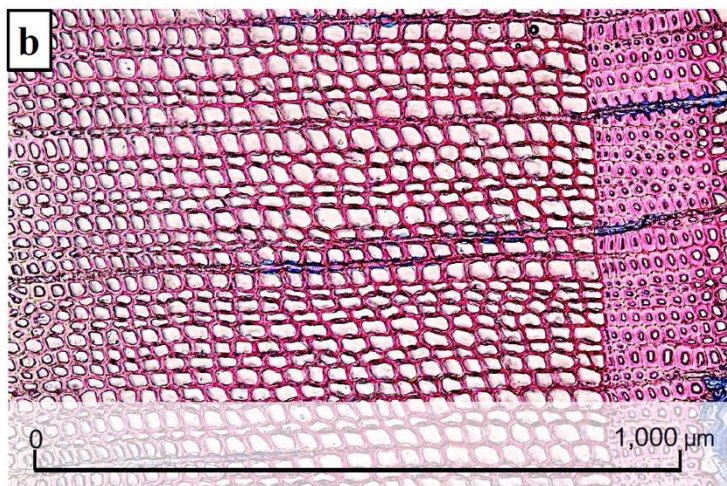
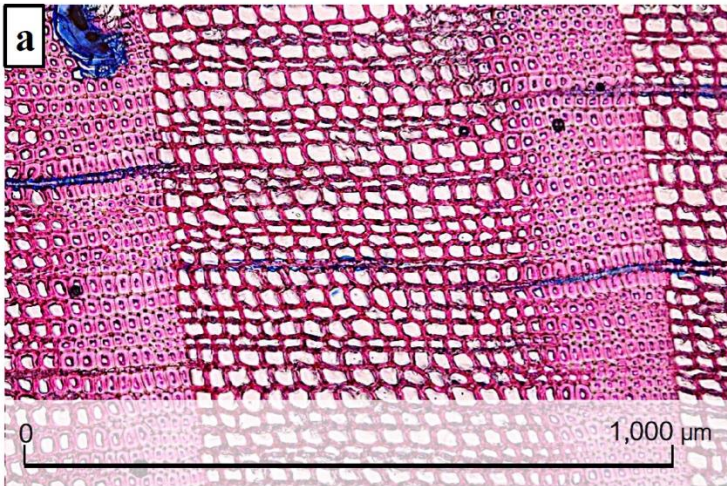
# Prescribed fire as a tool to prevent damages to soils and plants



## SOIL



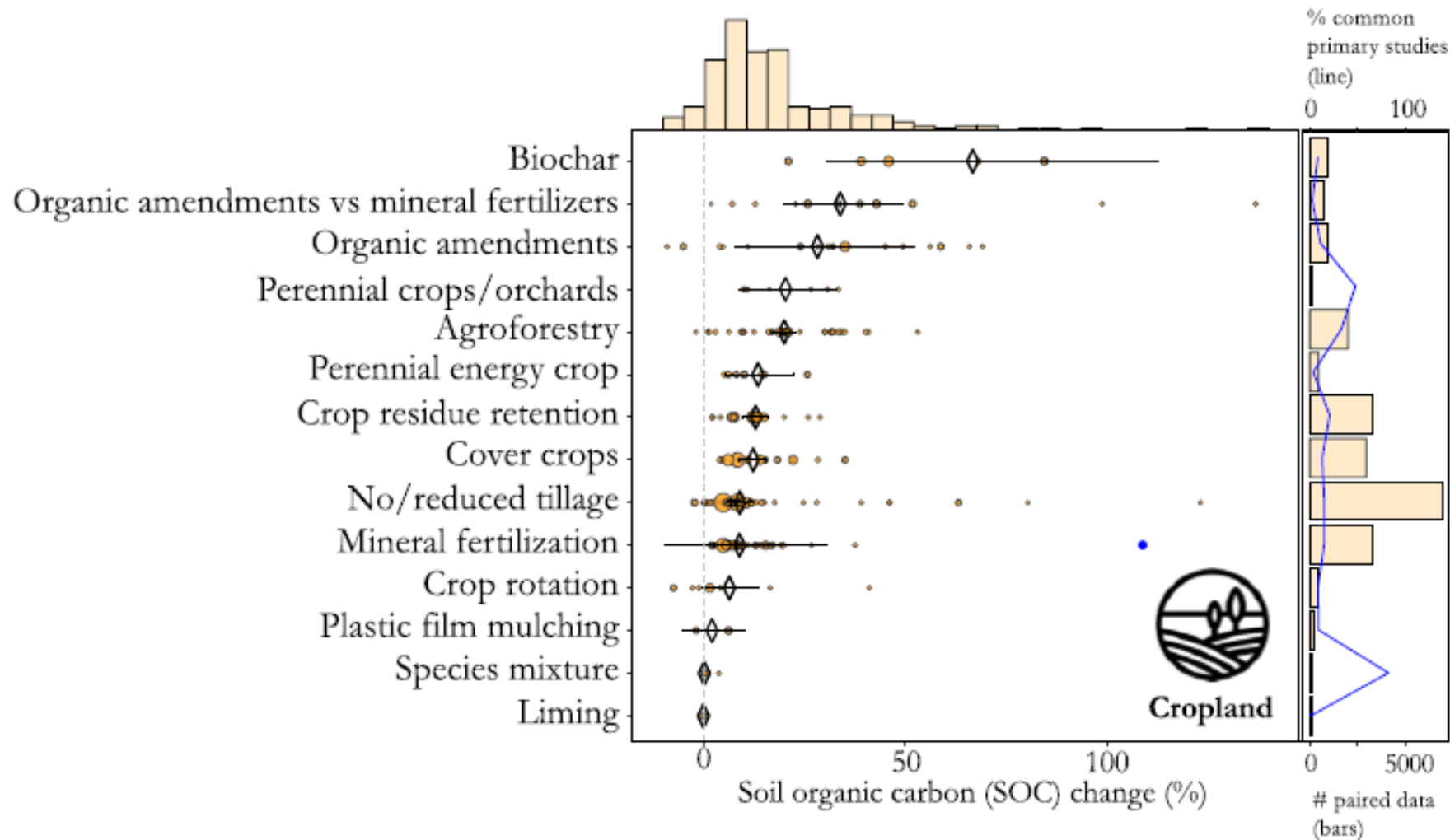
## PLANT



Gamba et al. 2025 Scientific Reports Under revision

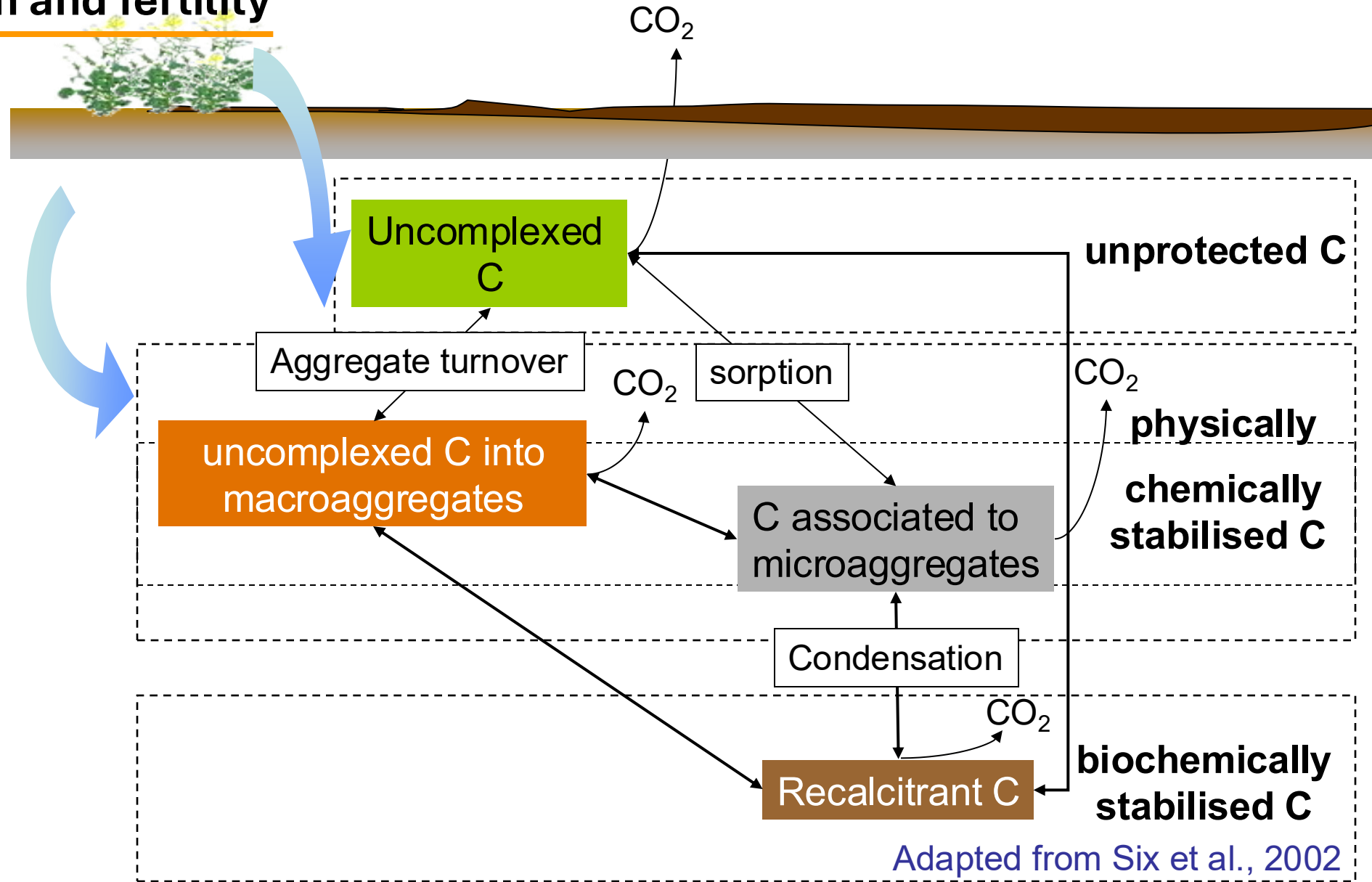


# Carbon SEQUESTRATION & FERTILITY



Beillouin et al. 2023

# Carbon sequestration and fertility



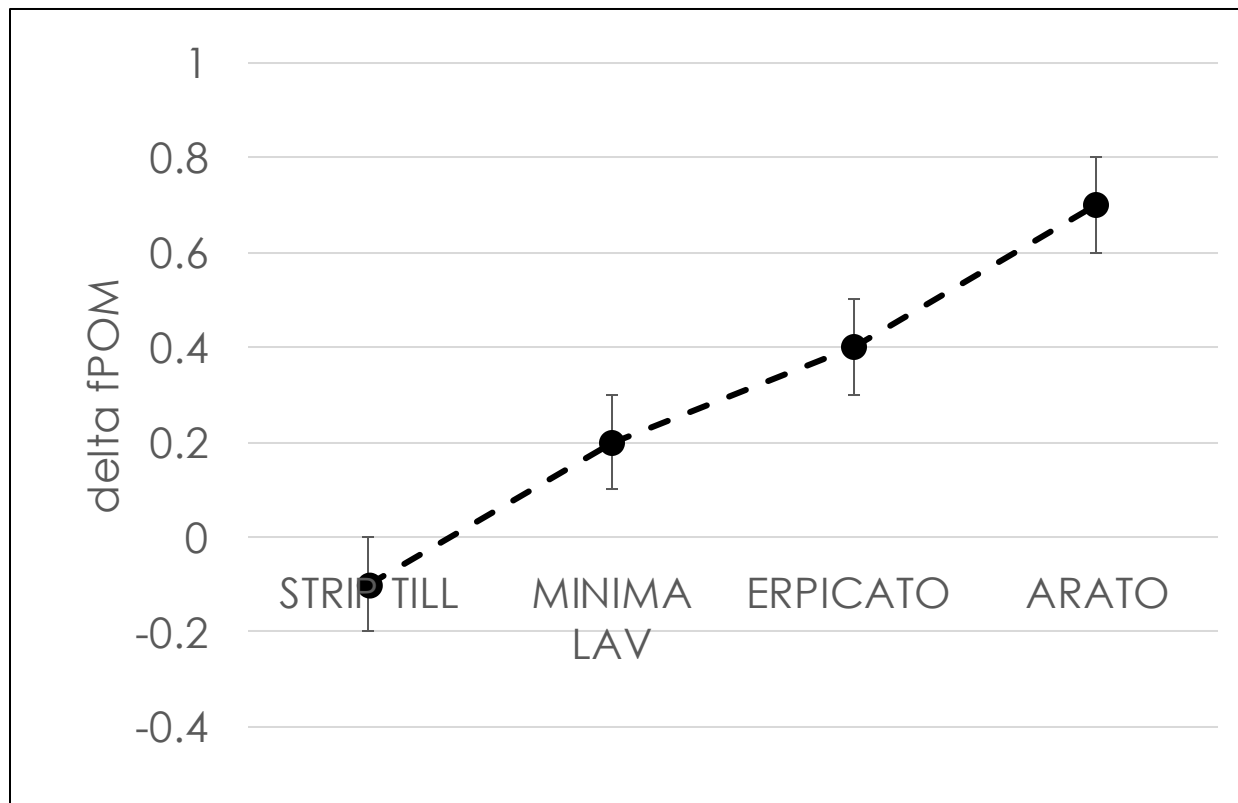
A better understanding of main mechanisms involved in soil organic carbon sequestration is fundamental

Promoting soil organic carbon stabilization in soil



# Carbon sequestration and fertility: SOIL MANAGEMENT

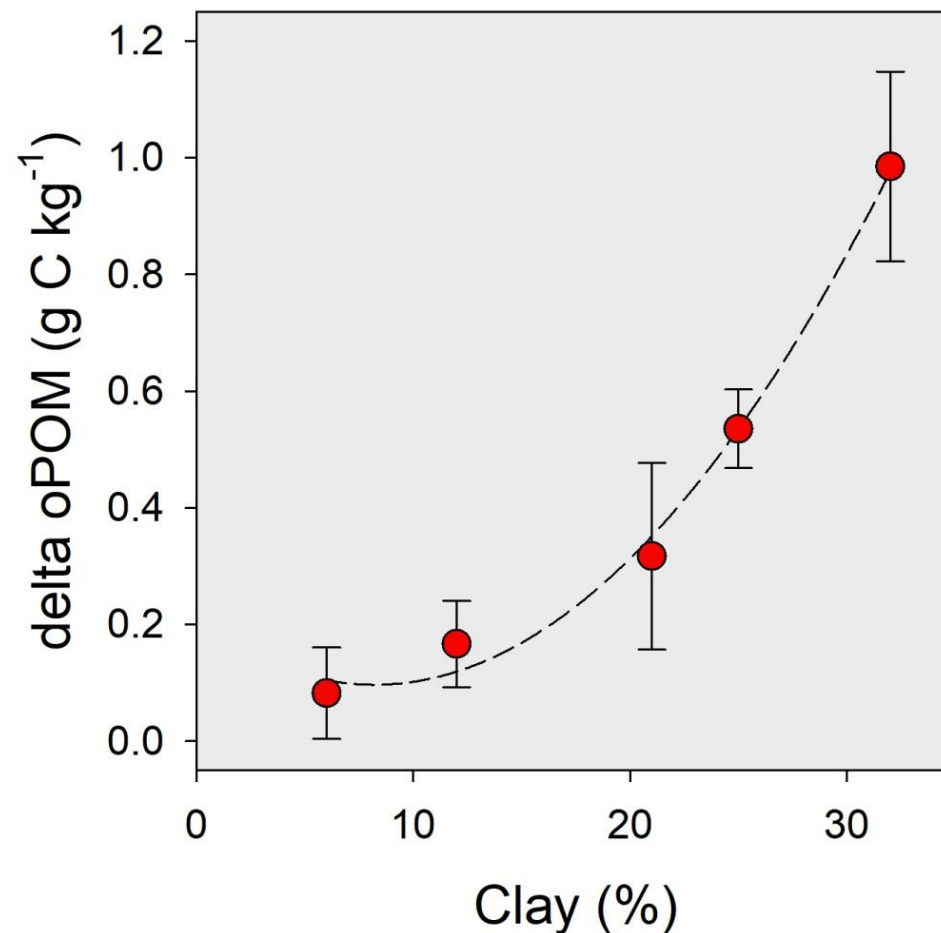
The unprotected OC decreases with tillage intensity



$$\Delta fPOM = fPOM_{No\ till} - fPOM_x$$

tillage

The occluded OC increases with clay increase



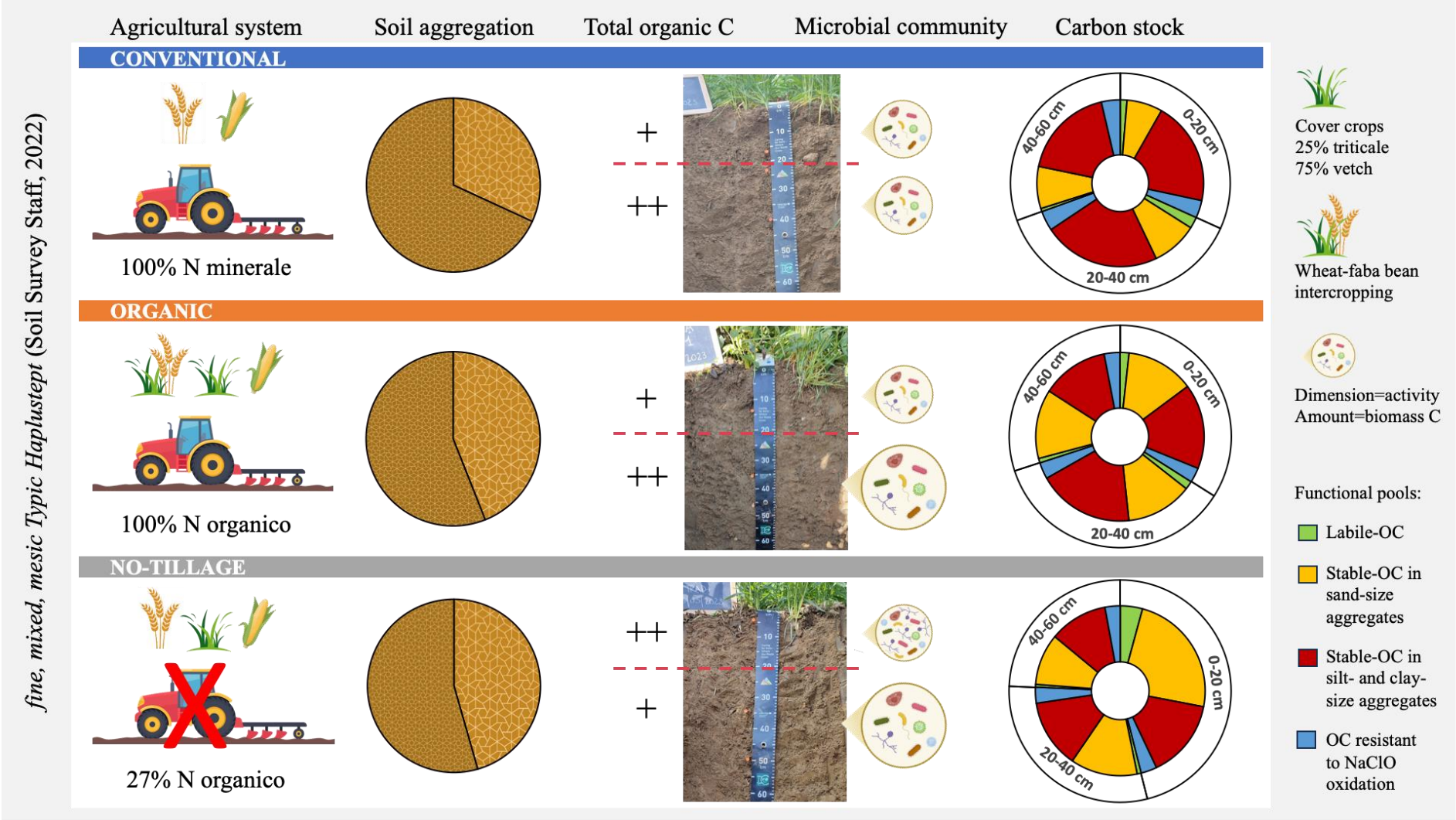
$$\Delta oPOM = oPOM_{No\ till} - oPOM_{Till}$$

Celi et al., 2022

# Carbon sequestration and fertility: SOIL MANAGEMENT

C storage in the top soil and subsoil

Complex equilibrium between C accumulation and input of cover crops with low C/N



Poesio et al., 2025



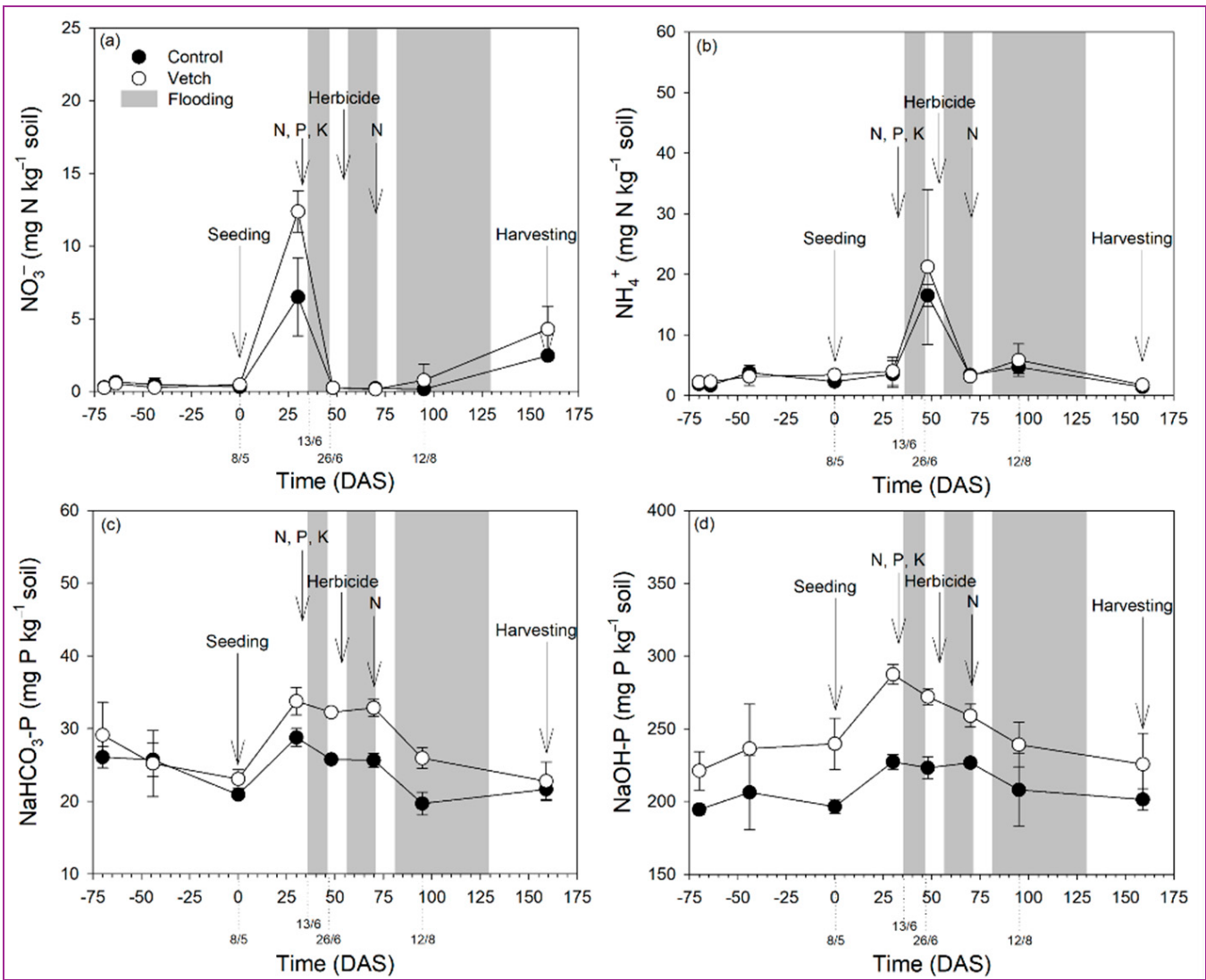
## COVER CROPS in RICE SYSTEMS



# Nutrient cycling and fertility: SOIL MANAGEMENT

N

P



C increase

Weed  
suppression

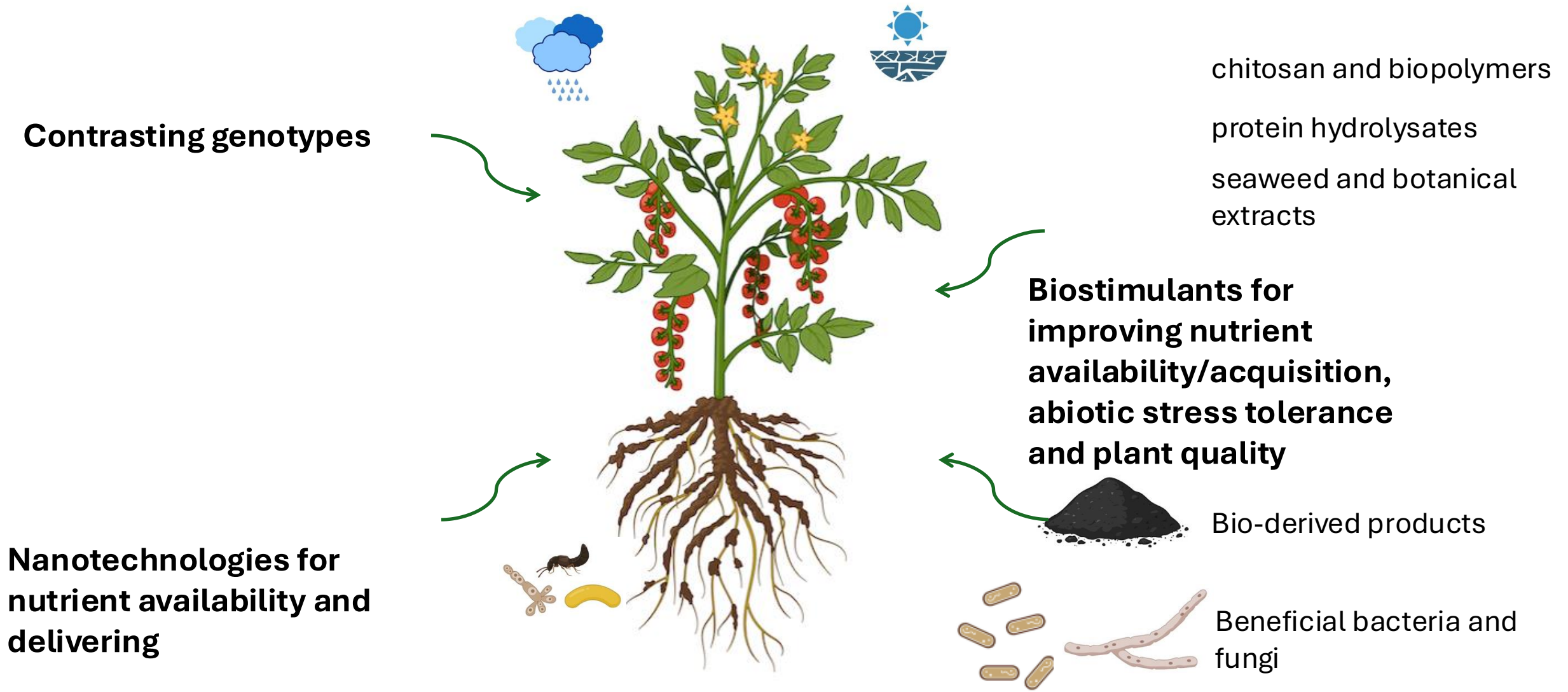
Temporal  
increase in  
soil available  
N and P

Optimal level  
of N  
fertilization  
with CC:  
80 kg  $\text{ha}^{-1}$

Lizcano Toledo et al 2022, Vitali et al. 2024

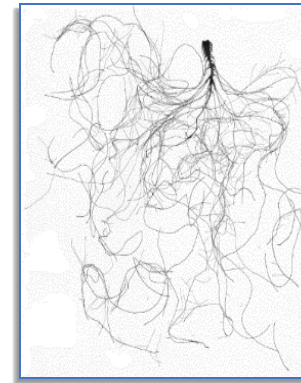
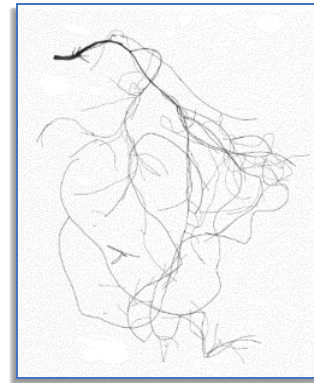
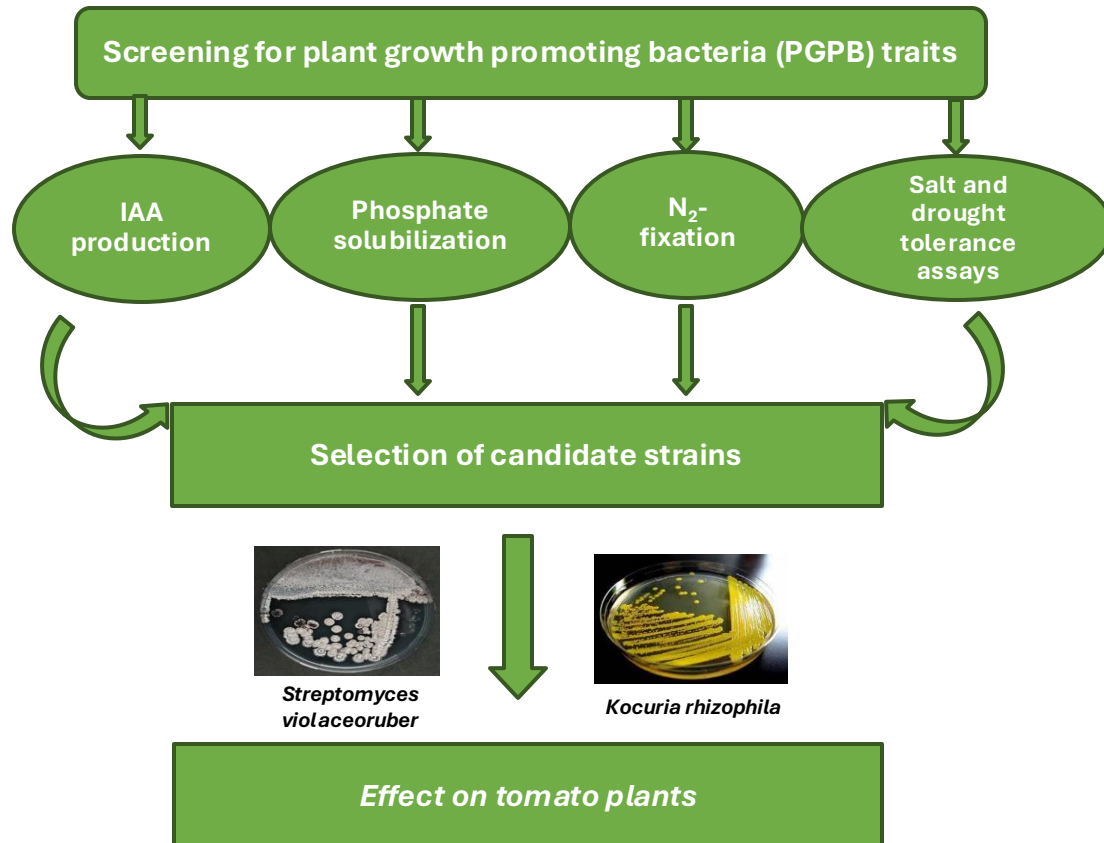


# Nutrient cycling and fertility: regeneration of the rhizosphere environment



# Plant growth-promoting microorganisms

PGPM enhance nutrition efficiency, abiotic stress tolerance and crop quality traits

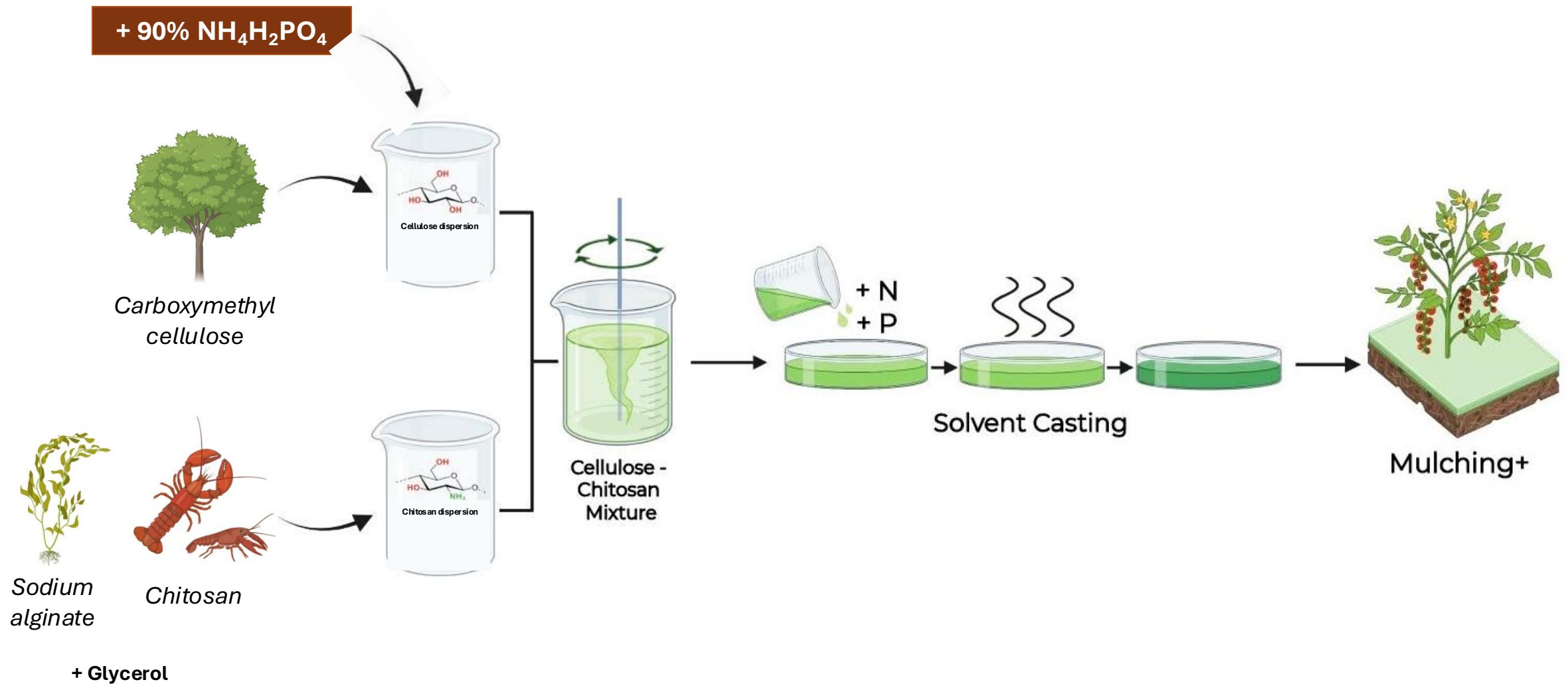


PGPM increase root system and tomato plant growth



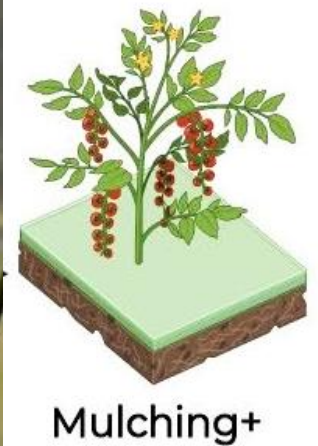
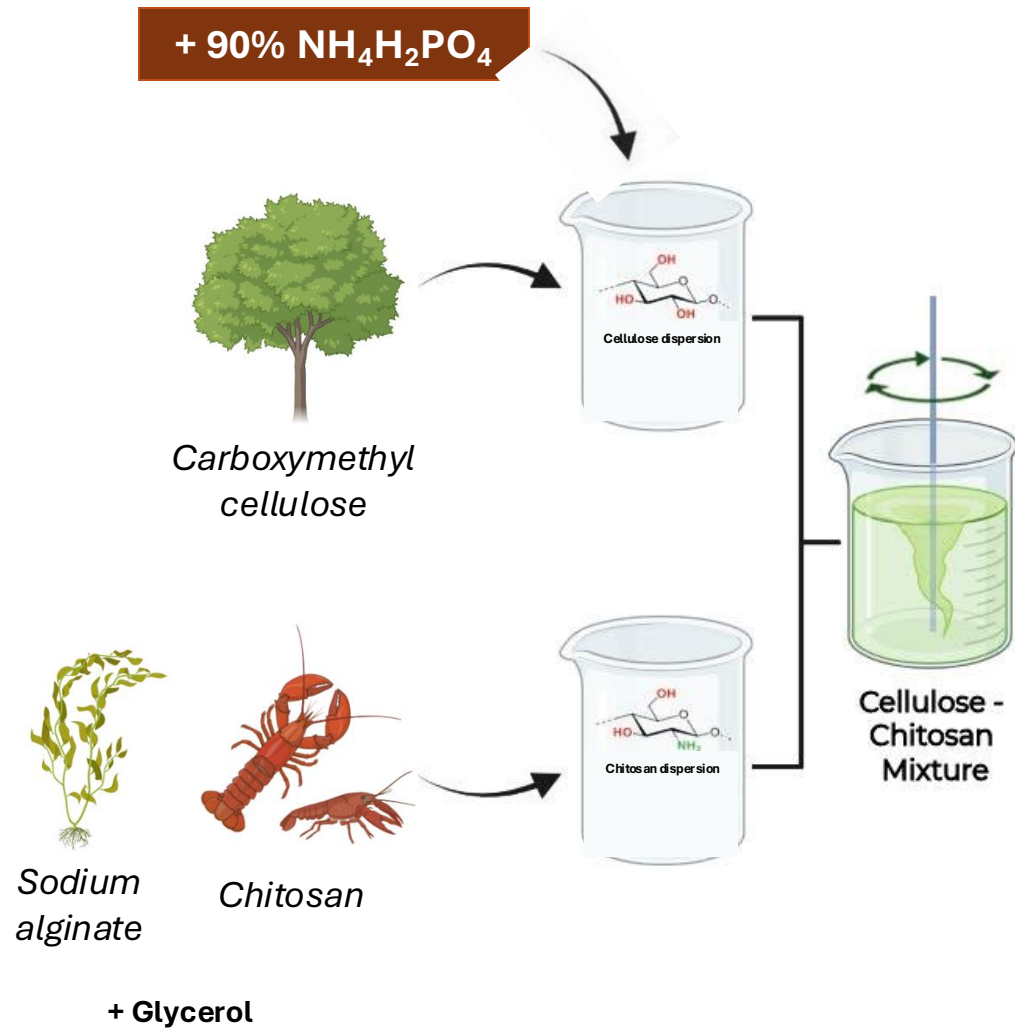


# Innovative bio-based mulching film



Ciaramitaro et al. (2024) <https://doi.org/10.3390/polym16162298>

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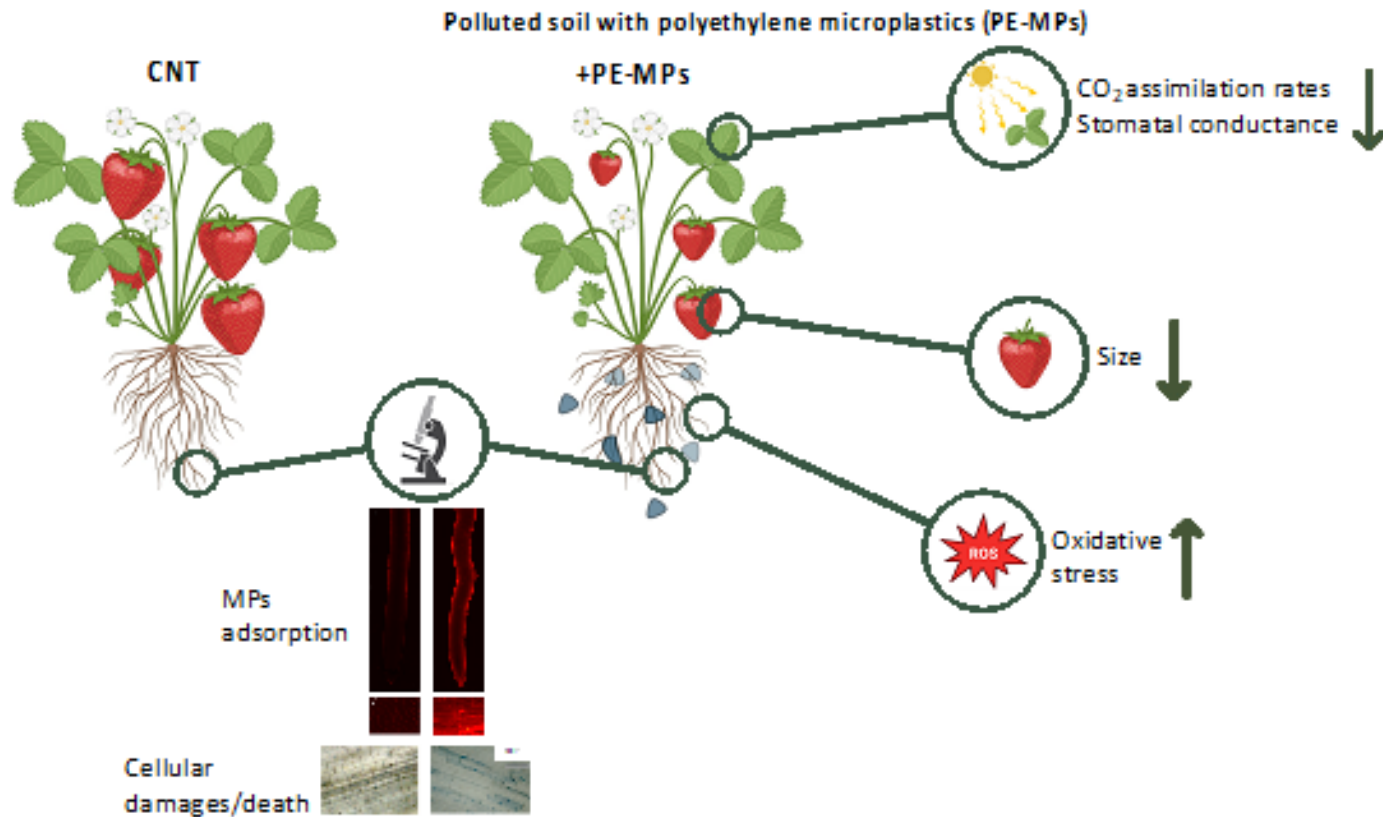
# Innovative bio-based mulching films enriched with N and P for a sustainable agriculture

High degradability (Laudicina et al. 2024)

Release of nutrients

Biodiversity (Mazzon et al 2022)

# Microplastics: how to prevent their damage?



- **MPs** accumulate in aquatic and terrestrial environments, representing a **global concern for the biosphere**
- The MPs presence leads to **root tissue damage** and a relative rise in oxidative stress in roots
- This behavior is due to the adherence of MPs on the root surface, able to **alter the plant water status**
- The **reduction in fruit size** was noted
- The **MPs entrance in food chain** is conceivable

Ceccanti et al. (2024) <https://doi.org/10.1016/j.jhazmat.2024.134164>



# Healthy soil-plant systems...

prevent extreme climate events

capture and store carbon

retain and cycle plant nutrients

suppress weeds

create healthy plants that are less  
vulnerable to biotic and abiotic stress

guarantee high crop productivity and quality

supporting food and human health



## ONE HEALTH





An aerial photograph showing a vast, dense forest with a thick canopy of green trees. The perspective is from directly above, looking down on the forest floor.

**PLANETARY HEALTH**

**THANK YOU**