

Possibilities of improving soil health status of Czech soil

Jaroslav Záhora

26th CONFERENCE OF THE WORKING
COMMUNITY OF THE DANUBE REGIONS,
UFT / BOKU TULLN 9. - 10. 4. 2019
Innovations for SOIL HEALTH



EUROPEAN UNION
European Regional
Development Fund



EUROPEAN TERRITORIAL CO-OPERATION
AUSTRIA-CZECH REPUBLIC 2007-2013
Gemeinsam mehr erreichen. Společně dosáhneme více.









Chemical Soil



Tight Soil
Low Infiltration
Low Oxygen
Small Roots

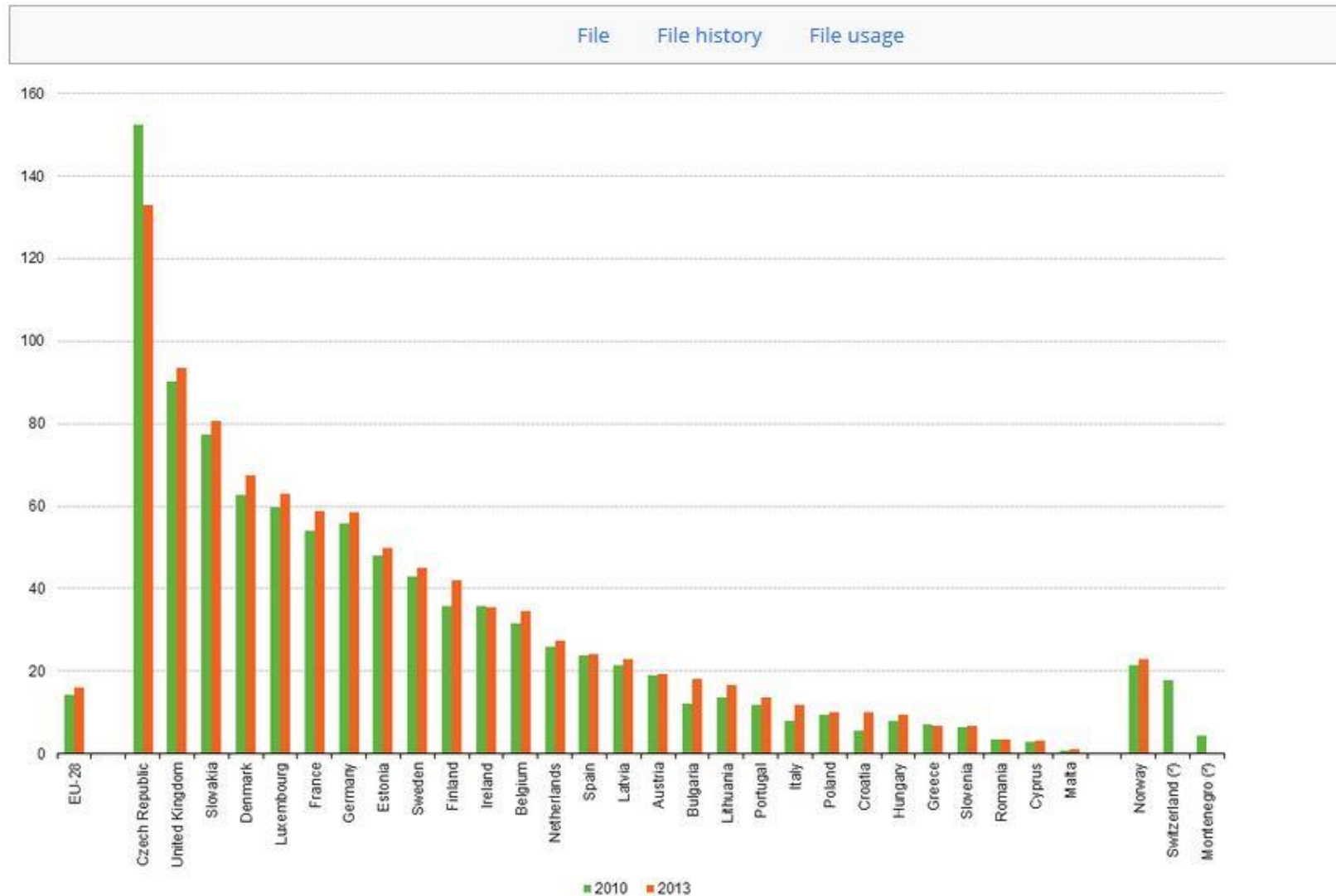
MicroLife Soil



Friable Soil
Higher Infiltration
Bigger Roots
More Water Stored



File:Average utilised agricultural area per holding, 2010 and 2013 (¹) (hectares) YB16.png



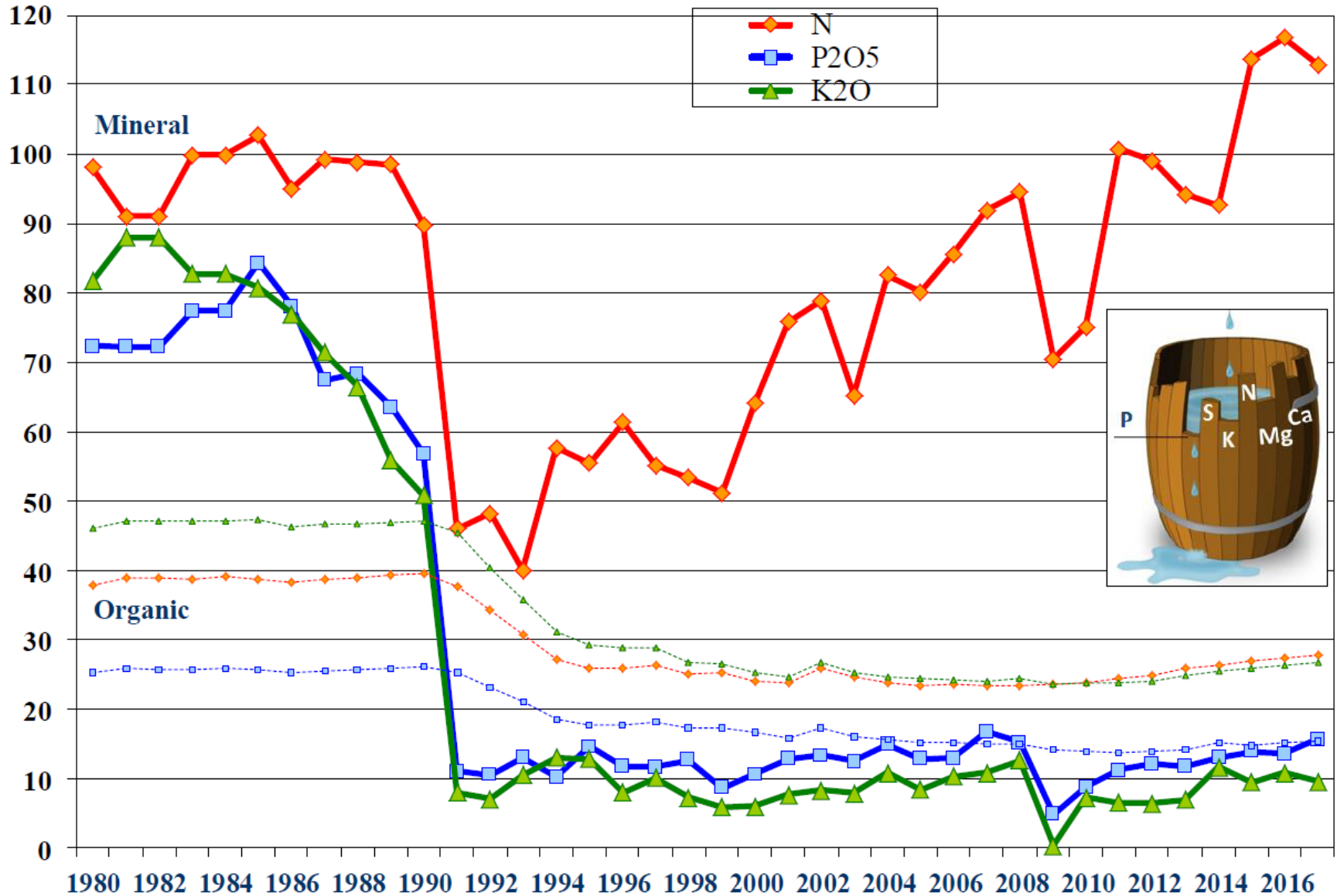
(¹) Iceland not shown for reasons of scale: 2010 value was 616 hectares.

(²) 2013: not available.

Source: Eurostat (online data code: ef_kvaareg)

Average fertilizers consumption in the Czech Republic

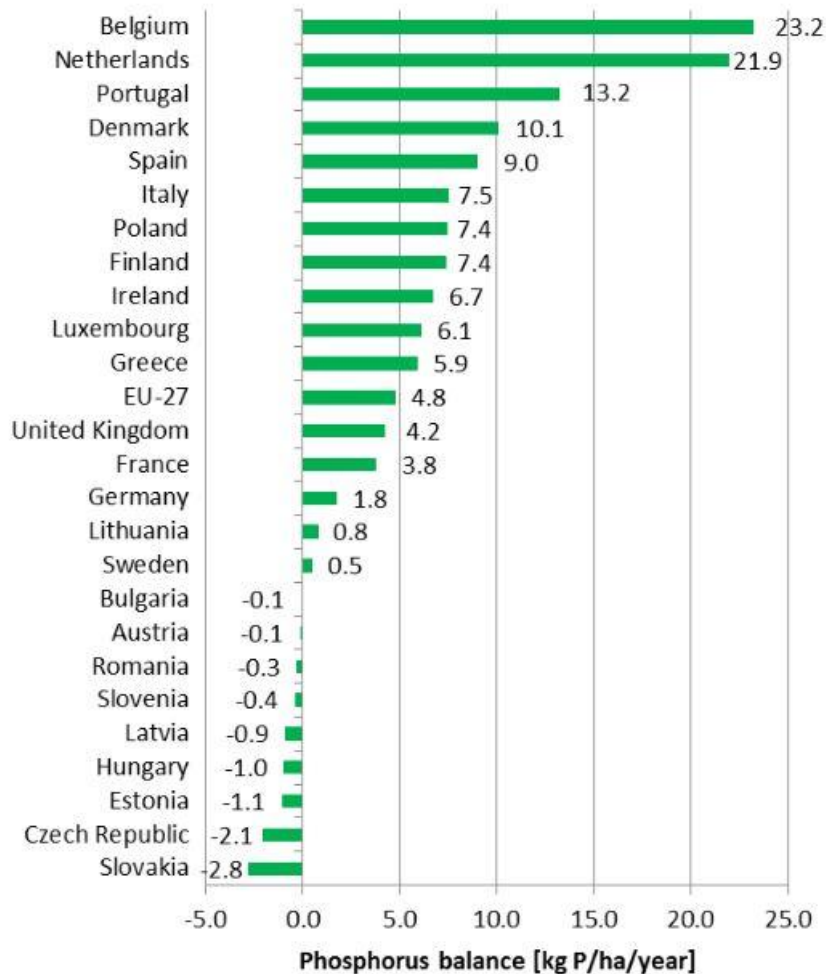
(kg of nutrients per 1 ha UAA: 3,5 mil. ha in 2017)



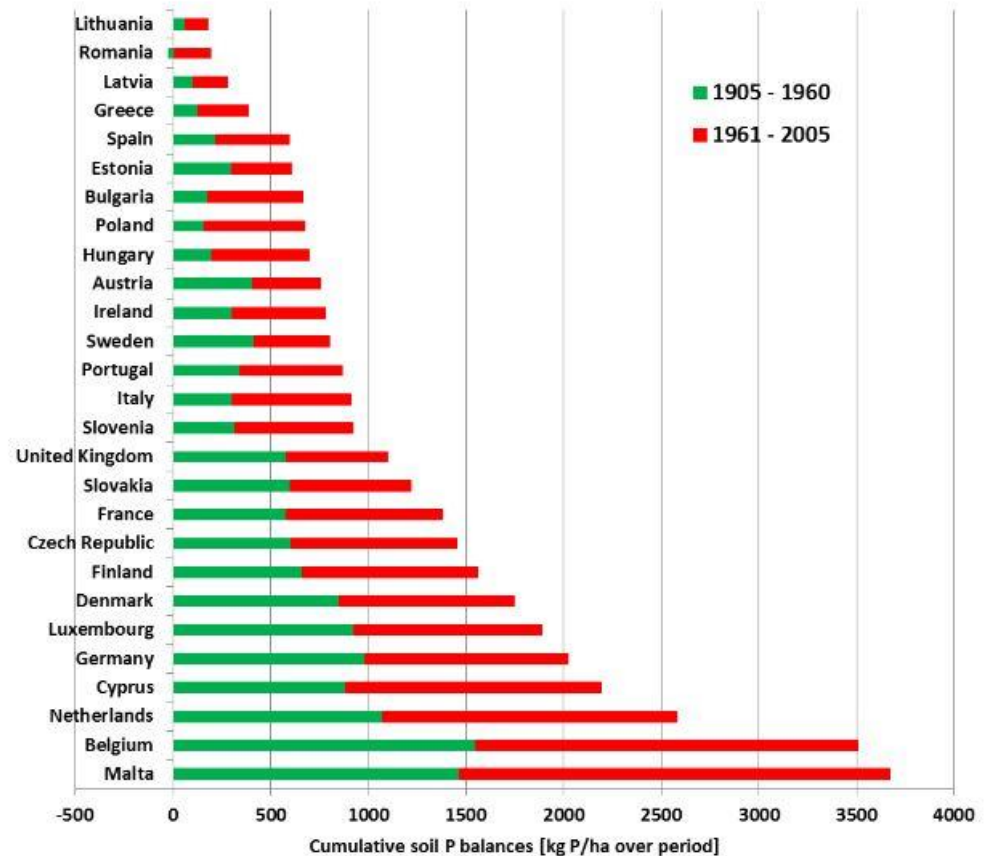
Soil structure, fertilizer management and crop cultivation in Czech agriculture

Jan Klír, Crop Research Institute, Praha – Ruzyně; Michal Hejzman, Czech University of Life Sciences Prague

Agricultural P balances per country for 2005 & period 1905 - 2005



128 Mtons P accumulated
in agricultural soils between 1905 -2005



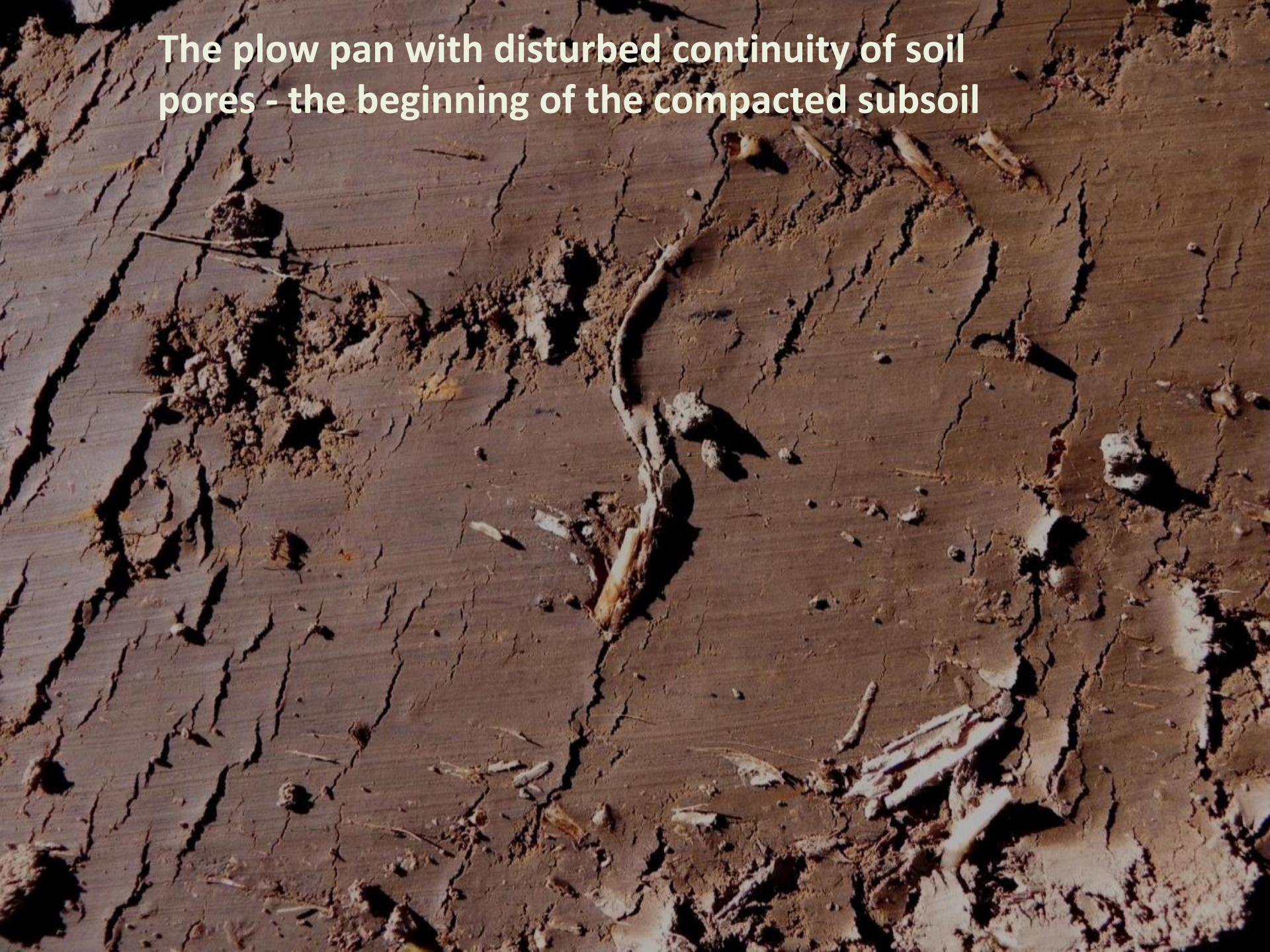








The plow pan with disturbed continuity of soil pores - the beginning of the compacted subsoil





Biological degradation leads to soil compaction that accelerates soil erosion



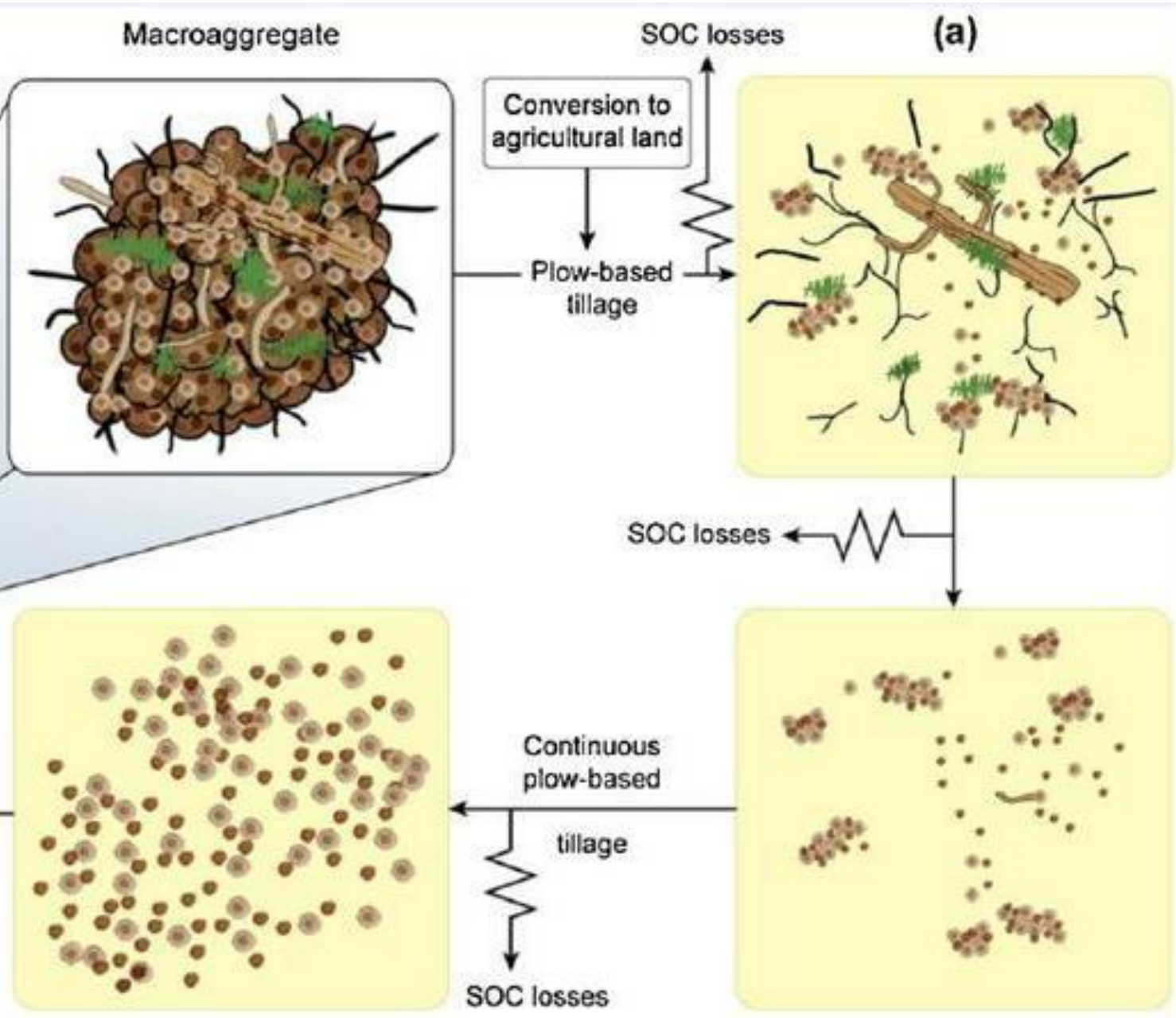
MICROBIAL AND FUNGAL
BYPRODUCTS GLUE
THE PARTICLES TOGETHER



DISPERSED STATE

AGGREGATED STATE





Soil & Tillage Research 126 (2013) 203–218

Contents lists available at SciVerse ScienceDirect

Soil & Tillage Research

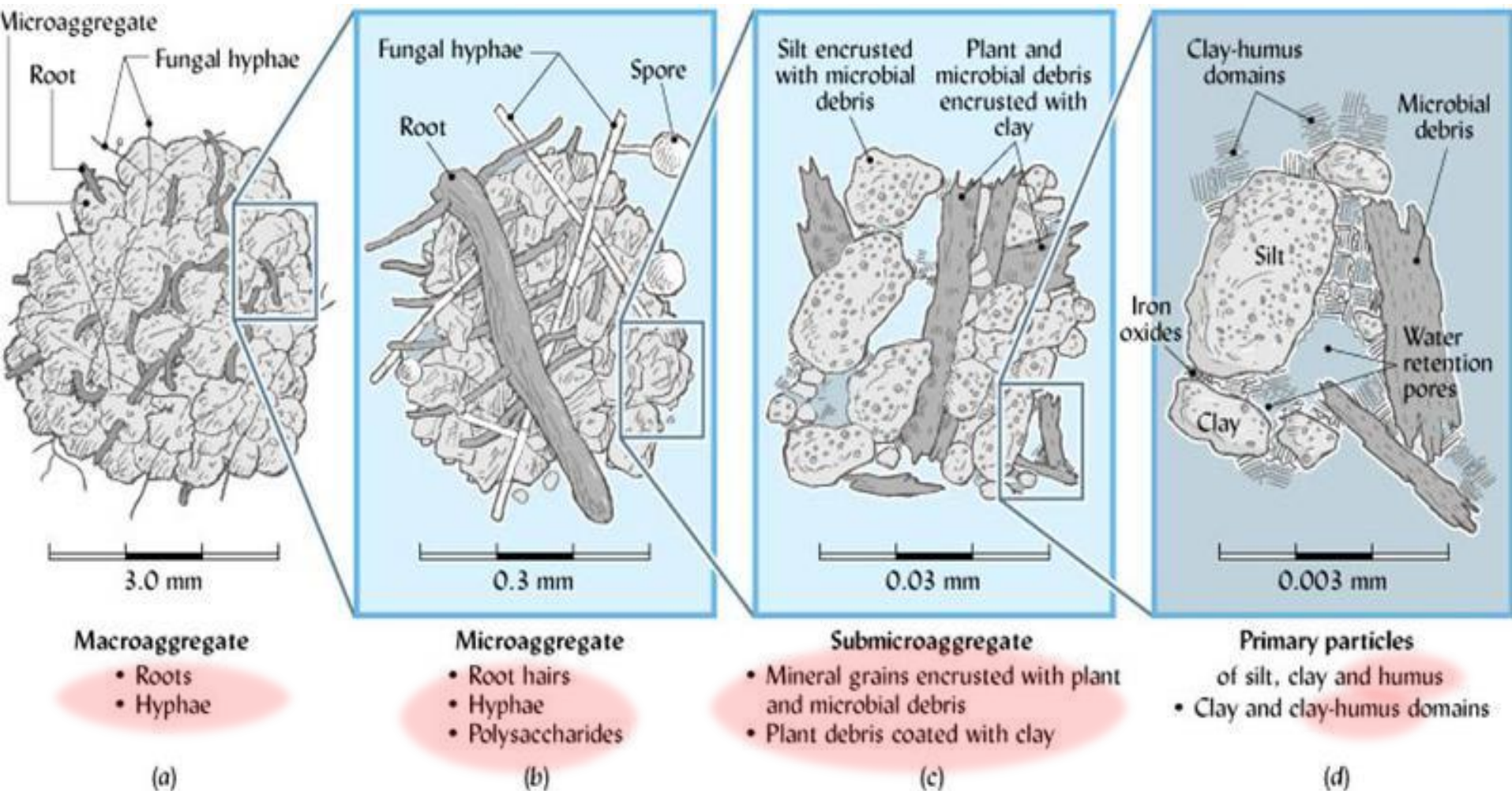
journal homepage: www.elsevier.com/locate/still



Aggregate C depletion by plowing and its restoration by diverse biomass-C inputs under no-till in sub-tropical and tropical regions of Brazil

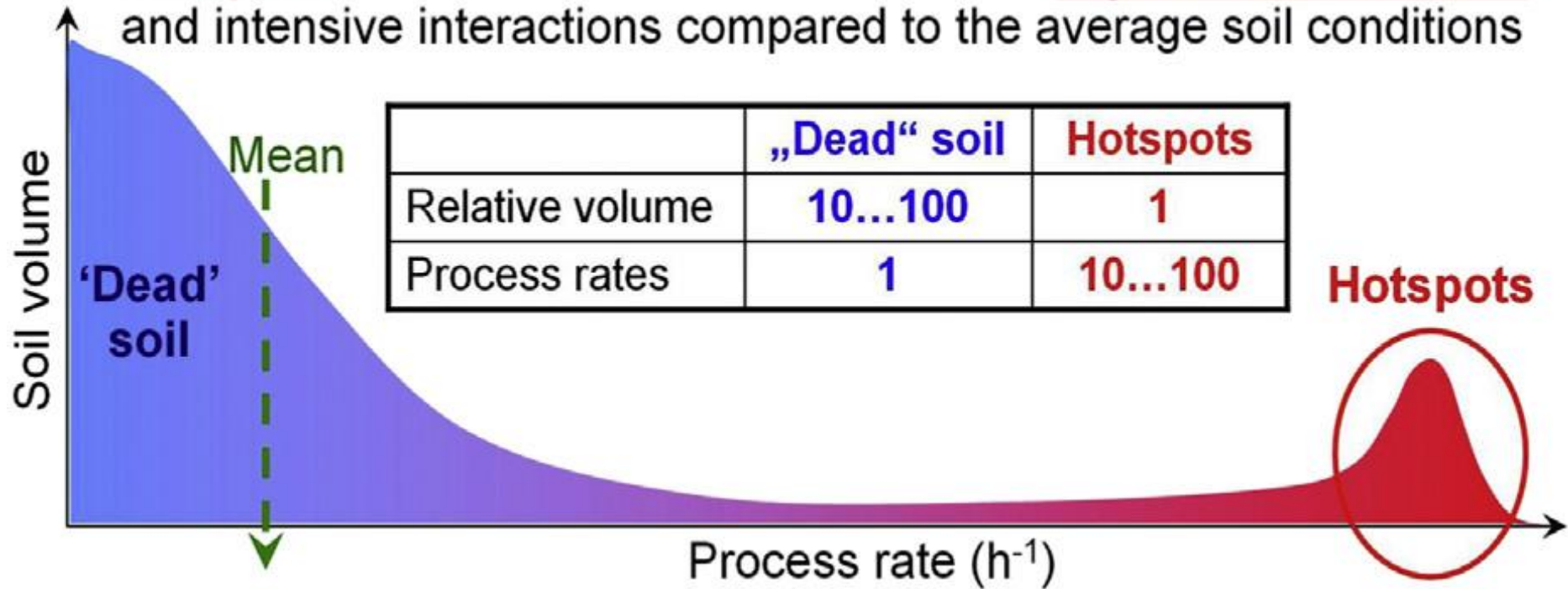
Florent Tivet^{a,c,*}, João Carlos de Moraes Sá^b, Rattan Lal^c, Clever Briedis^d, Paulo Rogério Borszowski^d, Josiane Bürkner dos Santos^d, Anderson Farias^e, Guilherme Eurich^e, Daiani da Cruz Hartman^e, Mario Nadolny Junior^e, Serge Bouzinac^a, Lucien Séguay^a

The importance of soil aggregates

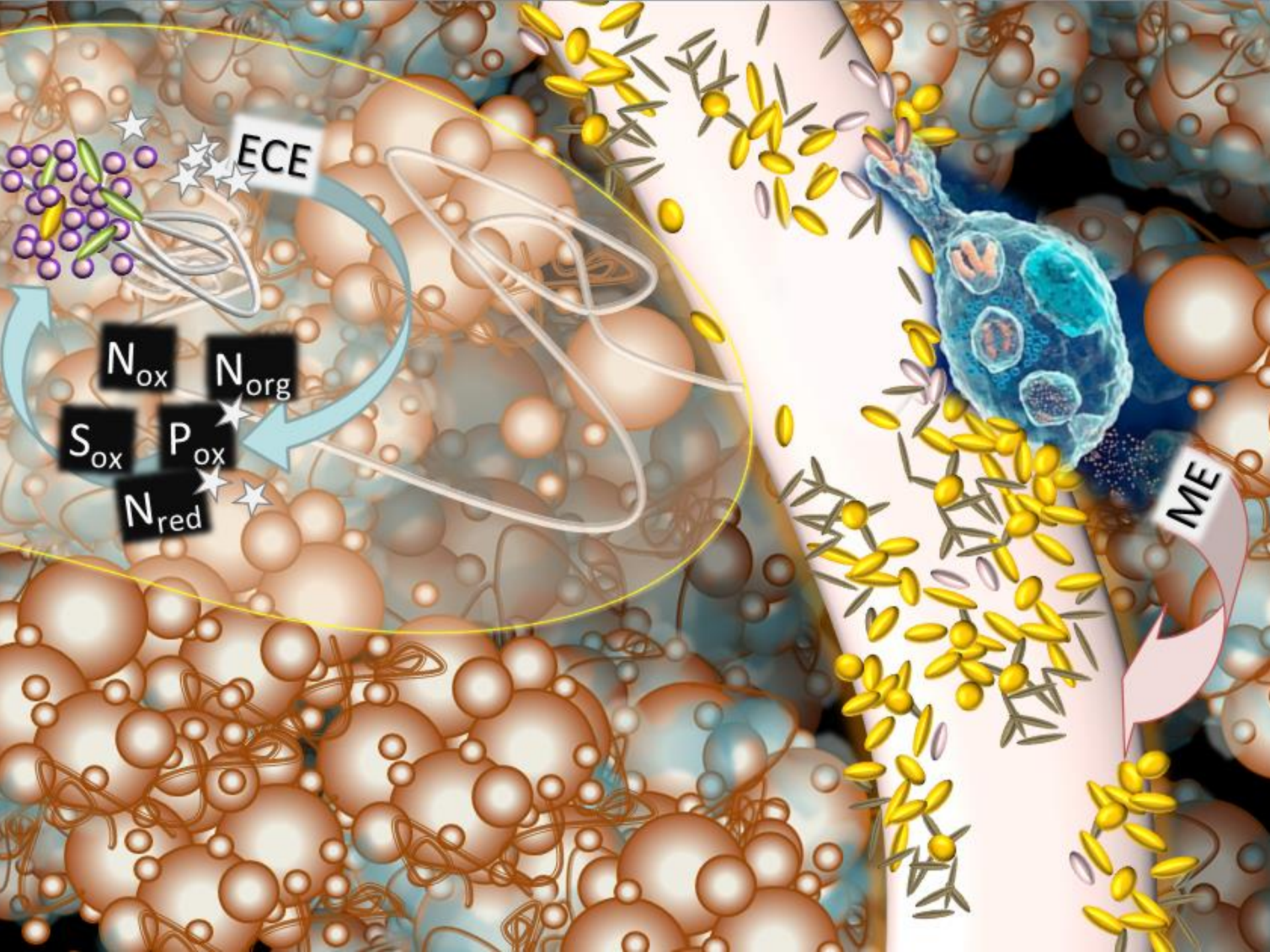


The organisms are crucial for formation of the soil, i.e. for aggregation of soil particles.

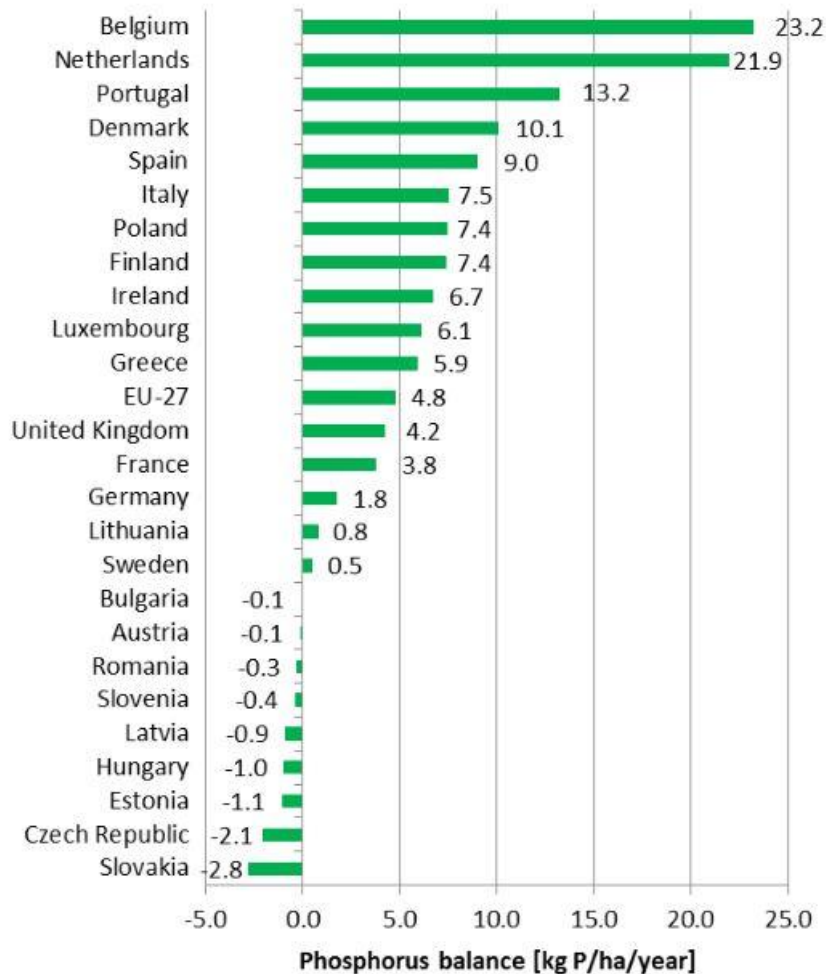
Hotspots are small soil volumes with much higher process rates and intensive interactions compared to the average soil conditions



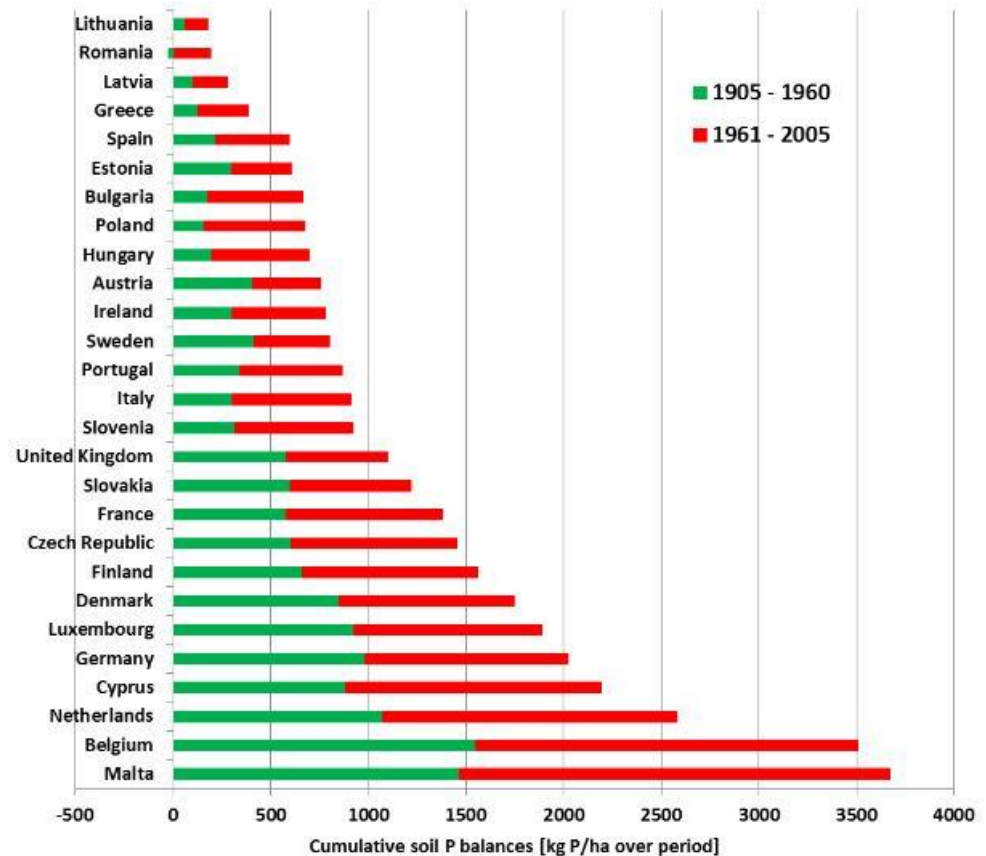
Concept of microbial hotspots in soil: Hotspots are small soil volumes with much higher process rates and intensive interactions compared to the average soil conditions. The Table inset represents the relative volume and process rates in the hotspots and bulk soil. “Mean” represents the weighted average process rates by soil mixing.

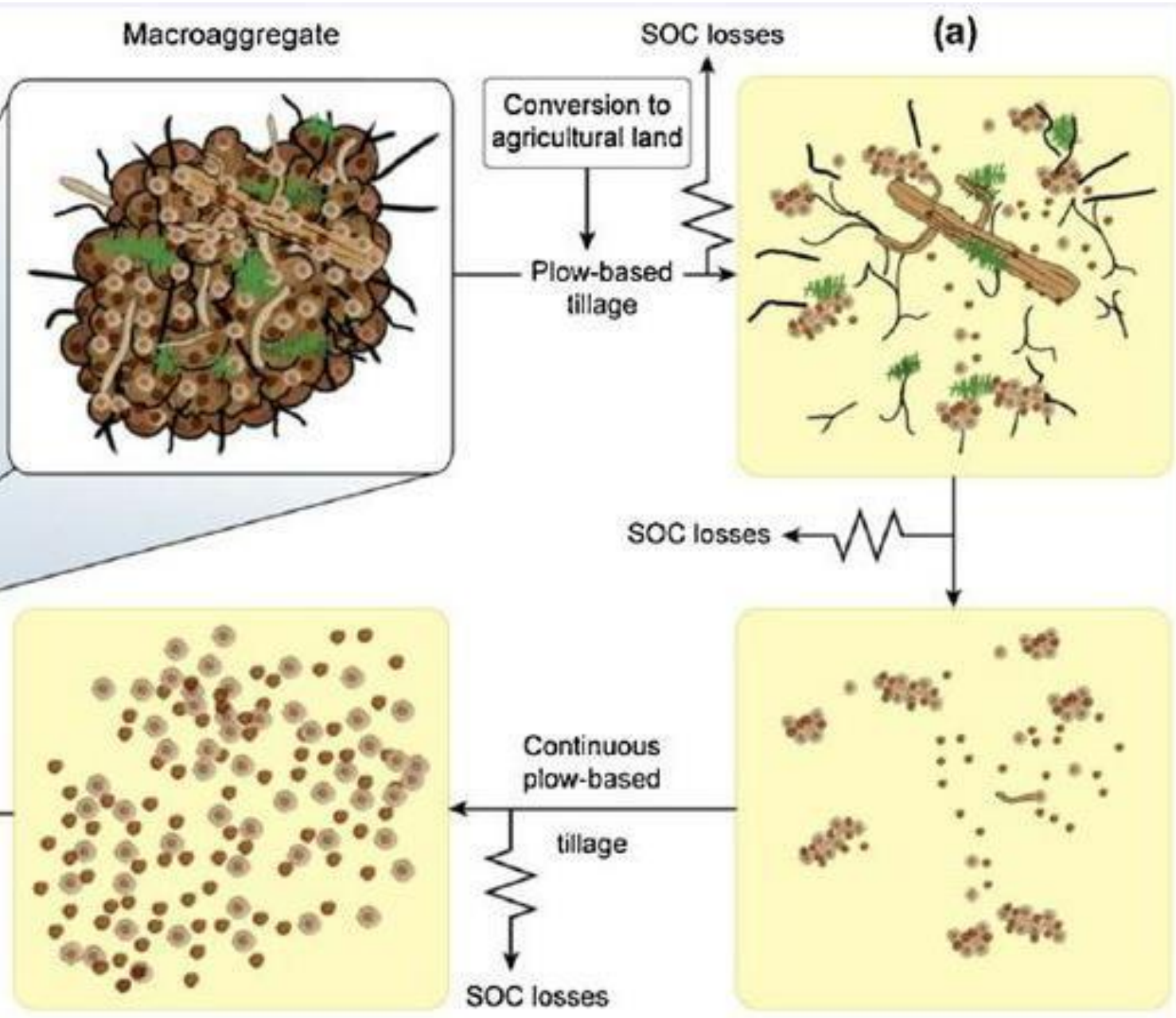


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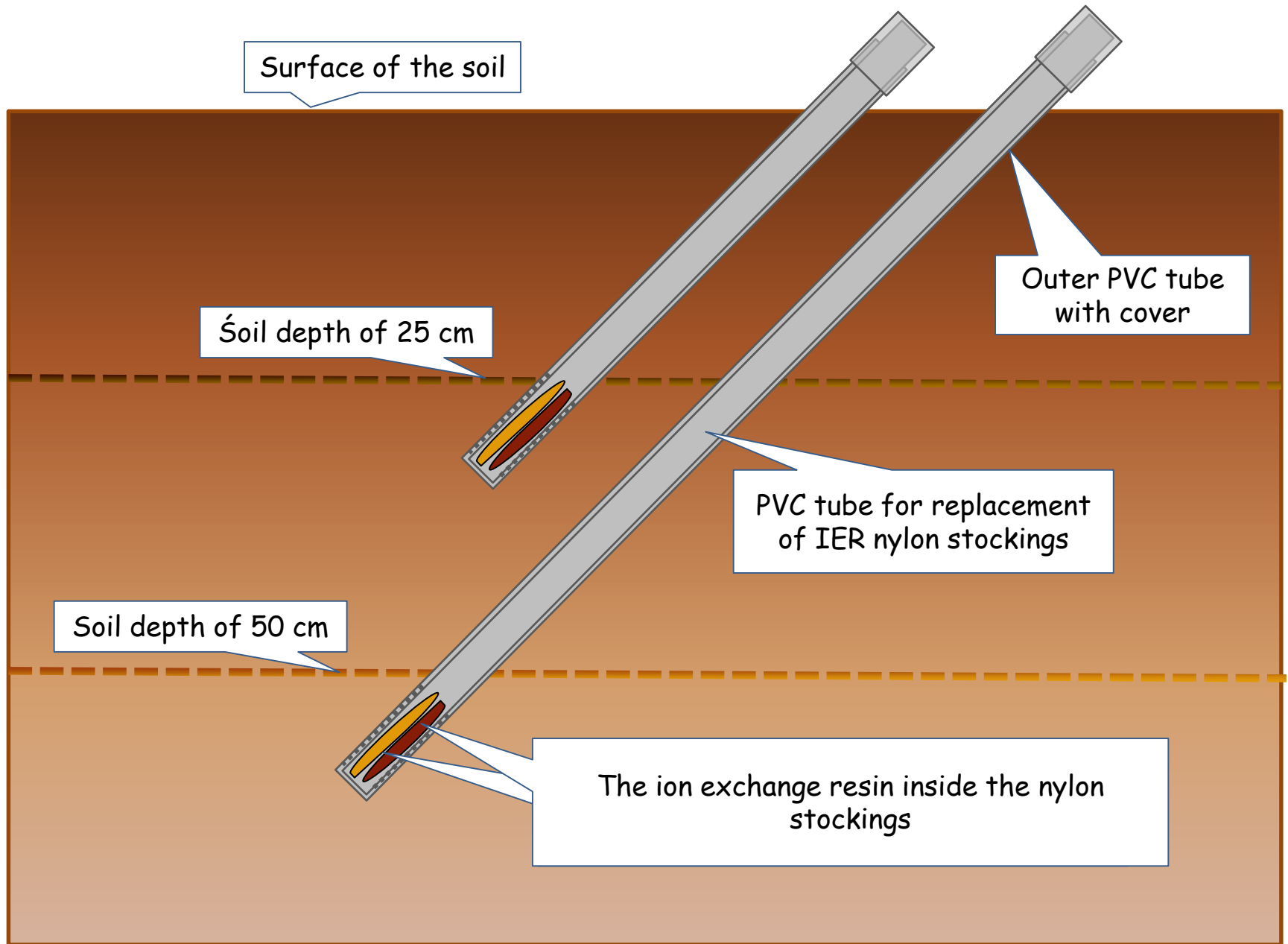
Aggregate C depletion by plowing and its restoration by diverse biomass-C inputs under no-till in sub-tropical and tropical regions of Brazil

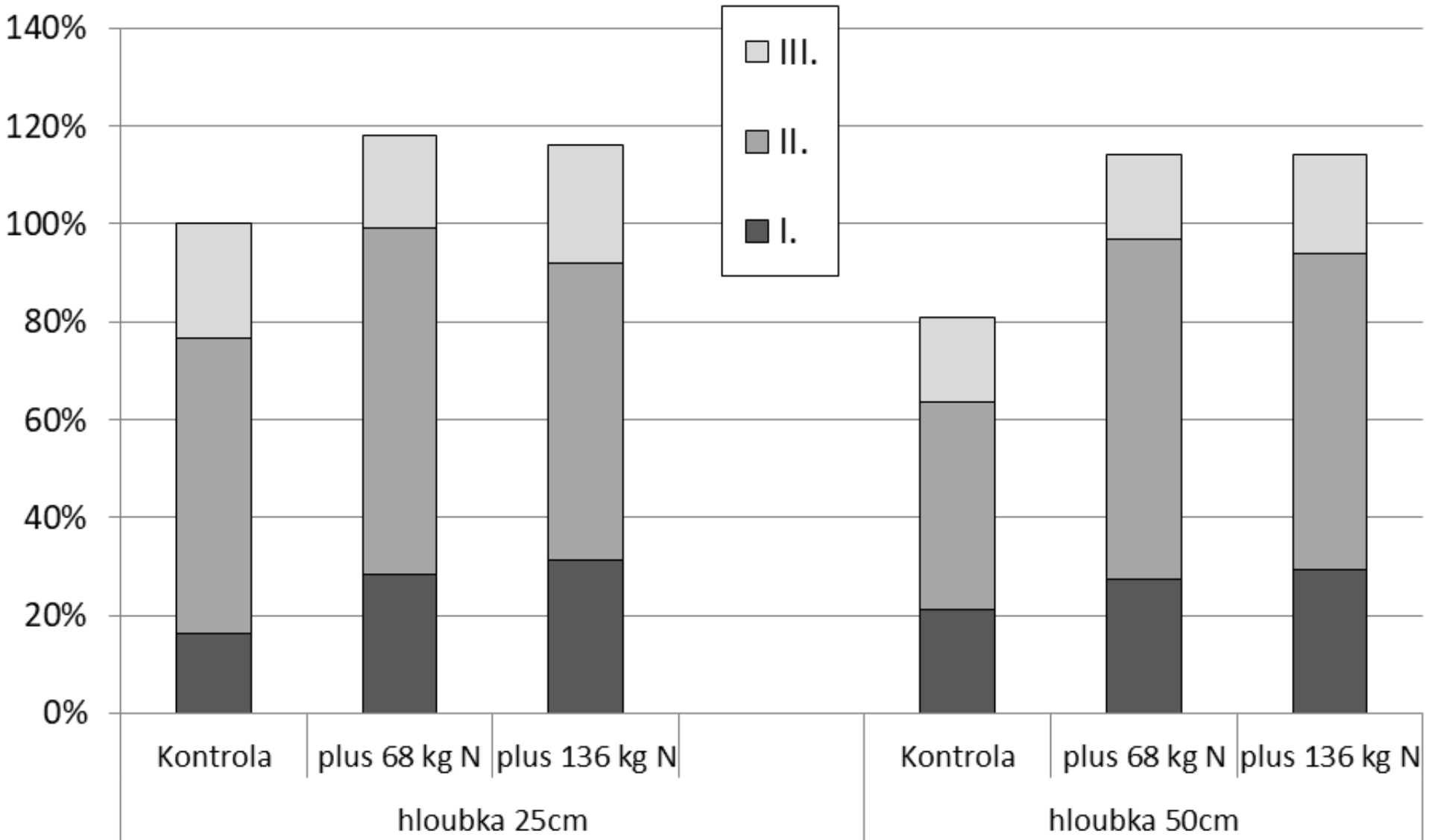
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bioforschung

Maschinenring

Projekt MinNC

Senning: Parzelle 5

Leguminosen + Nichtleg.
abfrostend „BFA1“

Begrünungsanbau: 04.08.2017
VF: Wickroggen

Grobkörniges und feinkörniges Saatgut wurden
getrennt mit dem SuperMaxx in einem
Arbeitsgang ausgebracht. Die Parzelle wurde am
21.07.2017 vorgegrubbert.

Saatstärke des groben & feinen Saatgutes:

135kg/ha

Platterbse

Sandhafer

Sommerwicke (Mery)

Ackerbohne (Fuego)

15kg/ha

Phacelia (Mewa)

Alexandrinerklee (Alex)

Perserklee (Gorby)

Oirettich (Radetzky)

Leindotter

Kresse

MIT UNTERSTÜTZUNG VON BUND, LÄNDERN UND EUROPÄISCHER UNION



LE 14-20



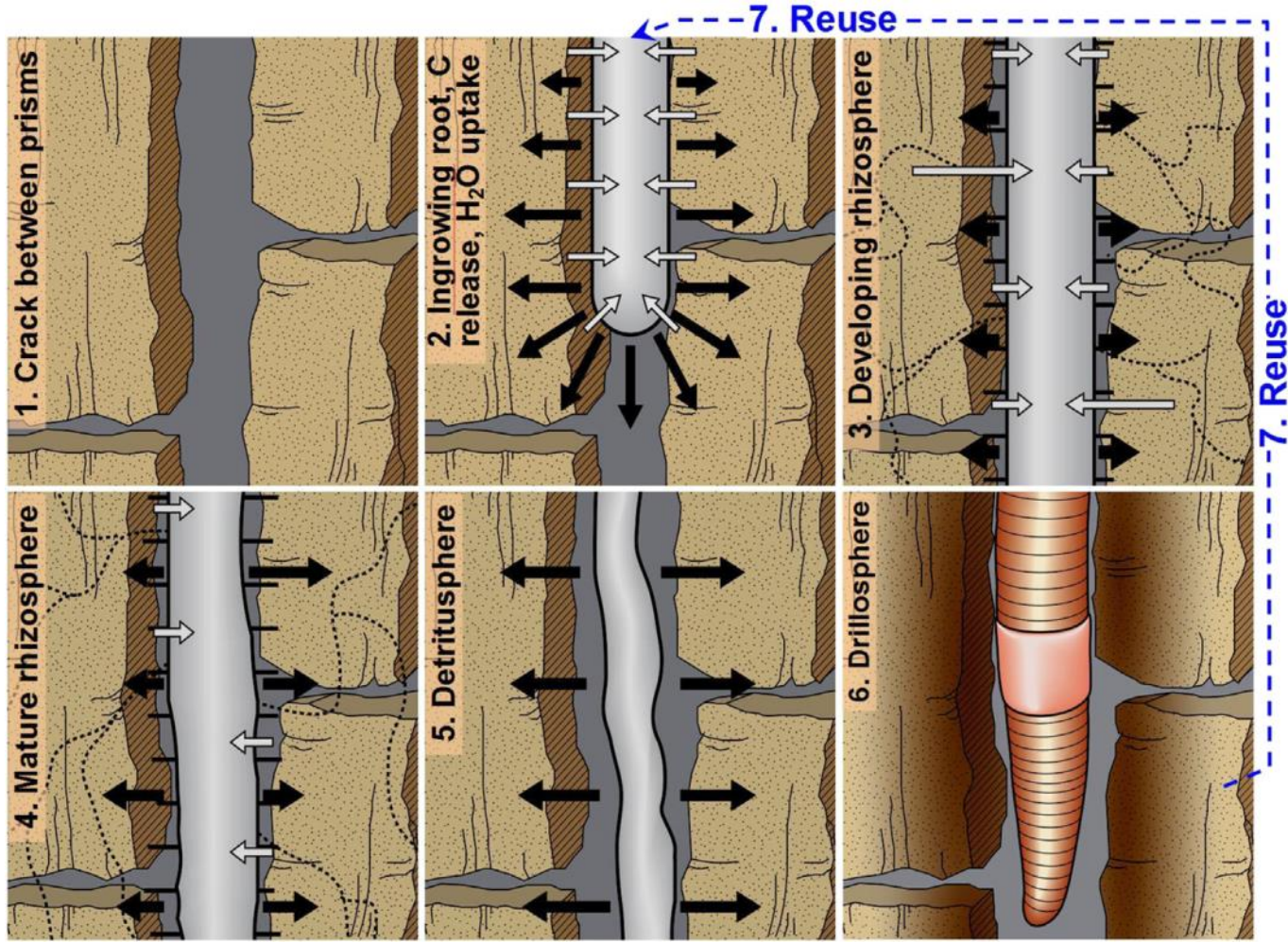
The goal:

- *minimizing of soil tillage*
- *continuous vegetation cover*
- *biodiversity as much as possible*
- *dissemination of new approaches and practices among farmers*



Unterirdische Leistung der Begrünungspflanzen,
Begrünungsversuch Stockerau 2010





Transition between the hotspots of multiple origins: 1) Crack between aggregates, 2) Juvenile rhizosphere: root ingrowing in the crack between aggregates, 3) Developing rhizosphere, 4) Mature rhizosphere, 5) Detritusphere: dying root, 6) Biopore: occupation of rhizosphere-detritusphere environment by earthworms, 7) Reuse of the existing hotspots: - back to ingrowing root and the rhizosphere. Black arrows show the C release by rhizodeposition; white arrows present the uptake of water and nutrients; black dotted lines reflect mycorrhizal hyphae.



Thank you for your attention