

MUNI | RECETOX

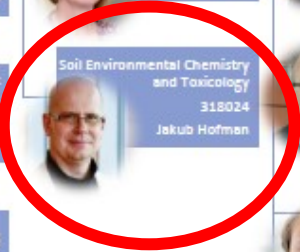
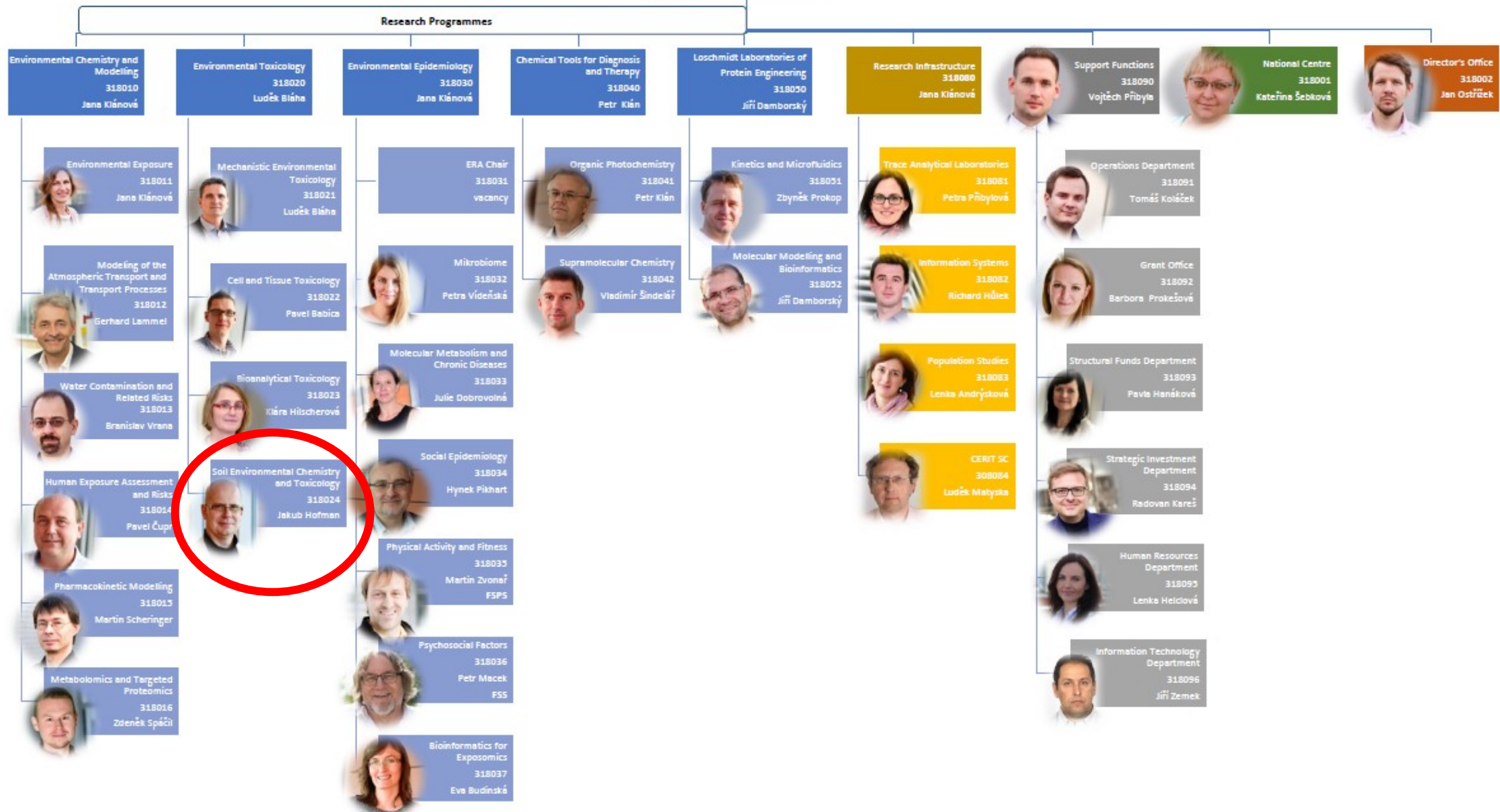
Skupina půdní environmentální chemie a toxikologie v RECETOX

Jakub Hofman



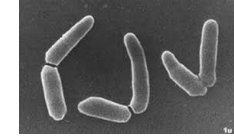
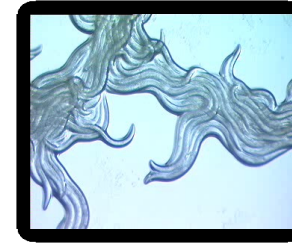


RECETOX
318000
Jana Klánová
Director



Čím konkrétně se zabýváme a co umíme

- (Půdní) ekotoxikologie



- (Půdní) environmentální chemie



- Pesticidy v ŽP – osud a dopady



- Kvalita a ochrana půd



H2020 project SPRINT

Sustainable Plant Protection Transition: A Global Health Approach

call: SFS-04-2019-2020 - Integrated health approaches and alternatives to pesticide use

A [2019] Integration of plant protection in a global health approach (RIA)

<https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/sfs-04-2019-2020>

Societal Challenges

Food security, sustainable agriculture and forestry, marine, maritime and inland water research and the bioeconomy

Projekt SPRINT

SUSTAINABLE PLANT PROTECTION TRANSITION: A GLOBAL HEALTH APPROACH

vývoj a rozvoj postupů pro
integrované hodnocení
opadů POR na ekosystémy,
rostliny, zvířata a zdraví lidí

vývoj sady nástrojů - tzv.
Global Health Risk
Assessment Toolbox

vedání a hodnocení cest
přechodu k udržitelnějšímu
využívání POR ve spolupráci
se stakeholdery

www.sprint-h2020.eu



WP9 - Project coordination and data management

Lead: WU & SKU

Case studies + modelling

WP2 - PPP distribution and health state

Lead: UBERN & AU

Lab assay + modelling

WP4 - (Eco)toxicological assessment

Lead: RAM & UAVR

Case studies + modelling

WP3 - Exposure assessment

Lead: SKU & UCSC

Modelling

WP5 - Health risk assessment

Lead: UU & MU

Modelling + lifecycle-based approaches

WP6 - Cost-benefit analysis

Lead: FIBL & DTU

WP7 - Transition paths and policy recommendations

Lead: ECOLOGIC

WP10 - Ethics requirements

Lead: SKU

WP1 - Stakeholders platform

Lead: LQM

WP8 - Dissemination, communication & Exploitation
Lead: CCRI

Případové studie

9. Groningen (The Netherlands)

10. Central zone (Denmark)

8. Central zone (Czech Republic)

11. Buenos Aires (Argentina)

3. Bordeaux (France)



7. Central zone (Slovenia)

6. Istria (Croatia)

2. Central zone (Portugal)

1. South East (Spain)

4. Canton of Bern (Switzerland)

5. Po Valley (Italy)

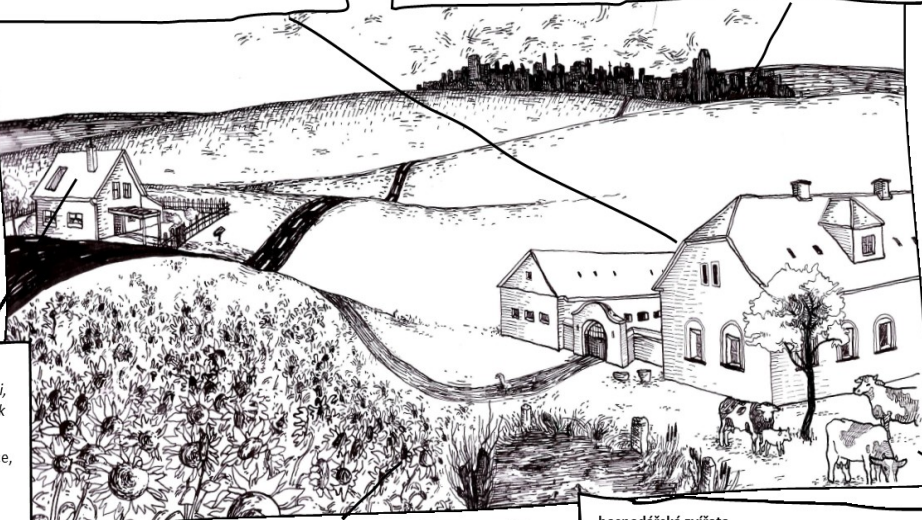


rodinná farma
muž a žena ve společné domácnosti

- odběry vzorků krve, moči, stolice, nosní výtěr
- nošení silikonového náramku vzorkujícího pesticidy z okolí
- odběr prachu z domácnosti
- vyplnění dotazníků o zdravotním stavu, životním stylu a stravování, používání pesticidů a hospodaření farmy
- účast na workshopech

účastníci vzdělání od zemědělství
muž a žena ve společné domácnosti, nefarmařící, žijící min. 1000 m od zemědělských ploch, mohou ale nemusí konzumovat produkty farmy

- odběry vzorků krve, moči, stolice, nosní výtěr
- nošení silikonového náramku vzorkujícího pesticidy z okolí
- vyplnění dotazníků o zdravotním stavu, životním stylu a stravování



sousedé
muž a žena ve společné domácnosti, nefarmařící, žijící do několika stovek metrů od poli

- odběry vzorků krve, moči, stolice, nosní výtěr
- nošení silikonového náramku vzorkujícího pesticidy z okolí
- vyplnění dotazníků o zdravotním stavu, životním stylu a stravování

pole a životní prostředí okolí farmy

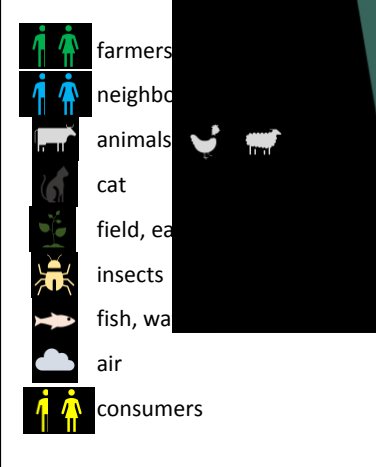
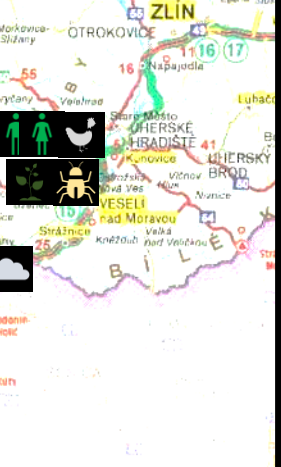
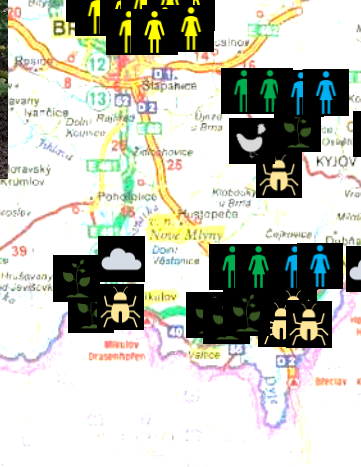
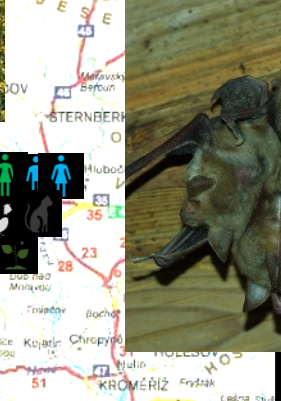
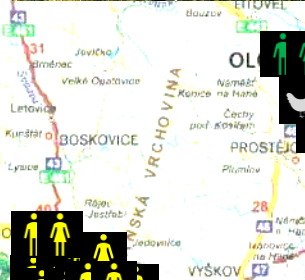
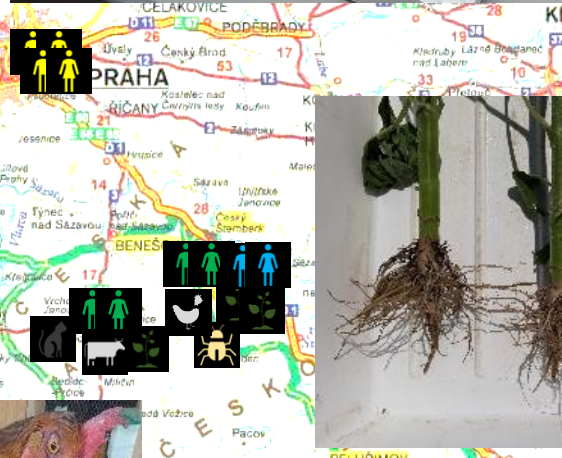
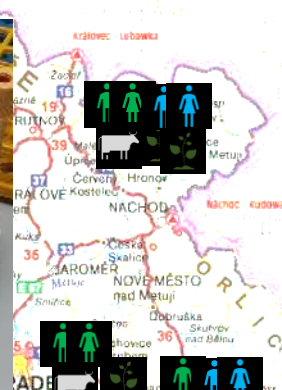
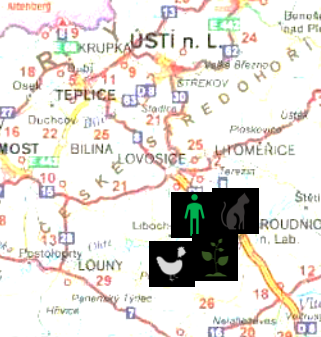
- odběr vzorků půdy, plodin, žížal a hmyzu
- sledování stavu včelstev v okolí
- případně odběr vody a stav ryb
- případně stav netopýrů

hospodářská zvířata
krávy, ovce, kozy, koně, prasata, slepice

- odběry vzorků krve, moči, stolice, případně mléka či vajec
- případně nošení silikonového náramku vzorkujícího pesticidy z okolí
- případně odběr vzorků krmiv



kresba: Viktorie Štěpánová



Laboratorní studie ekotoxicity a

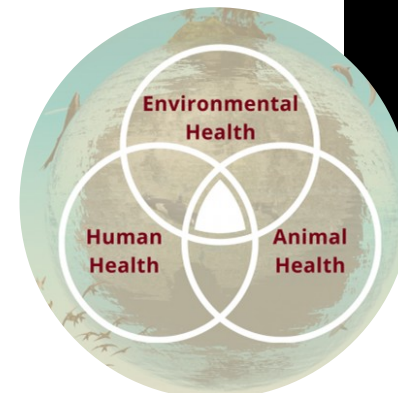
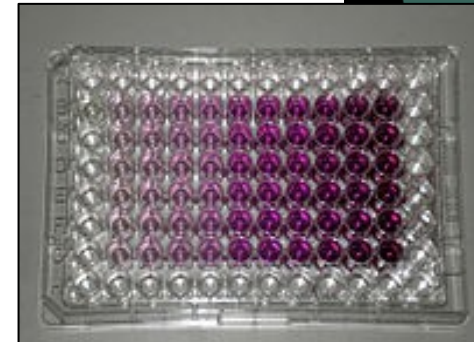
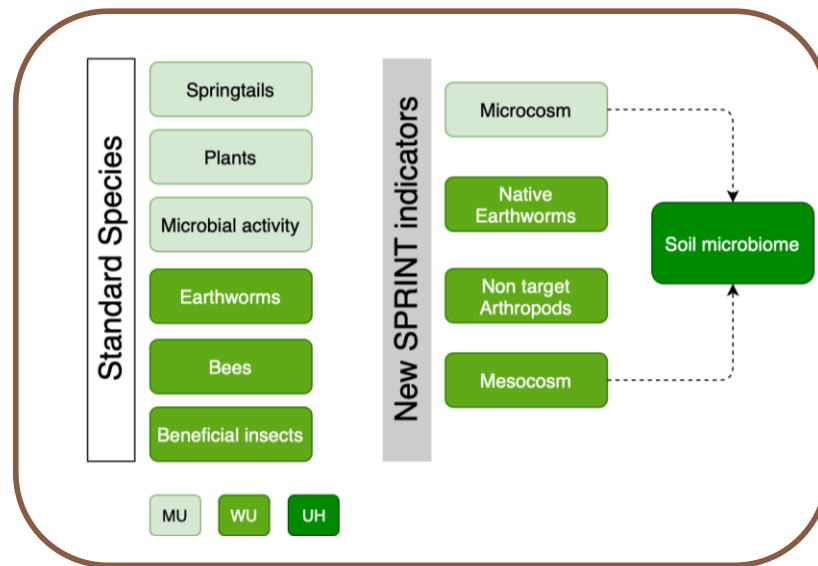
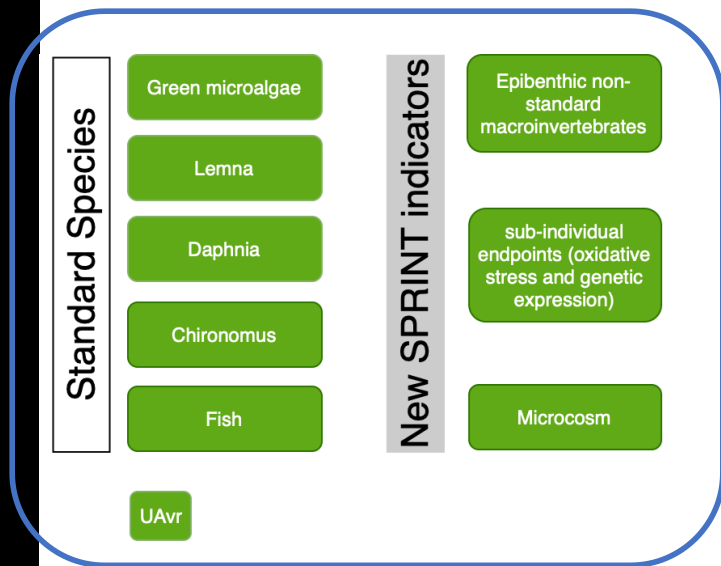
toxicity

zaměření na směsi látek z reálných scénářů

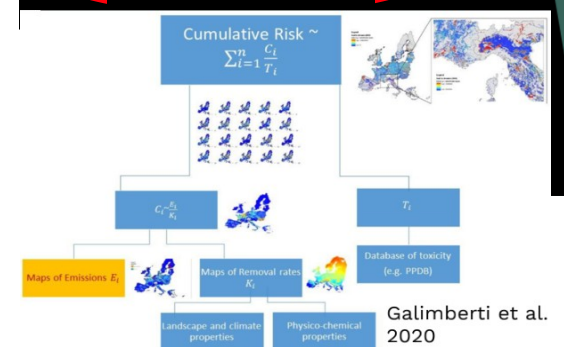
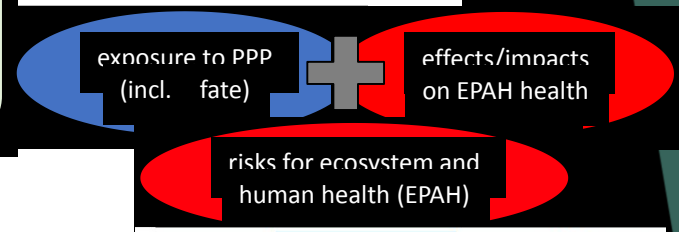
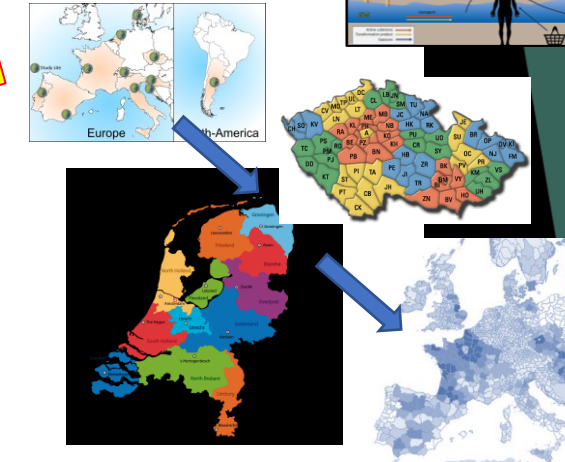
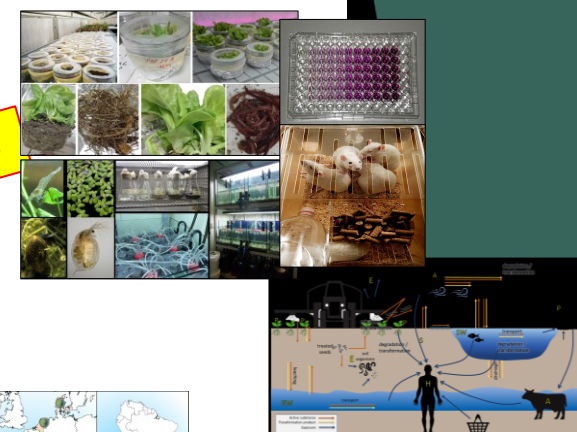
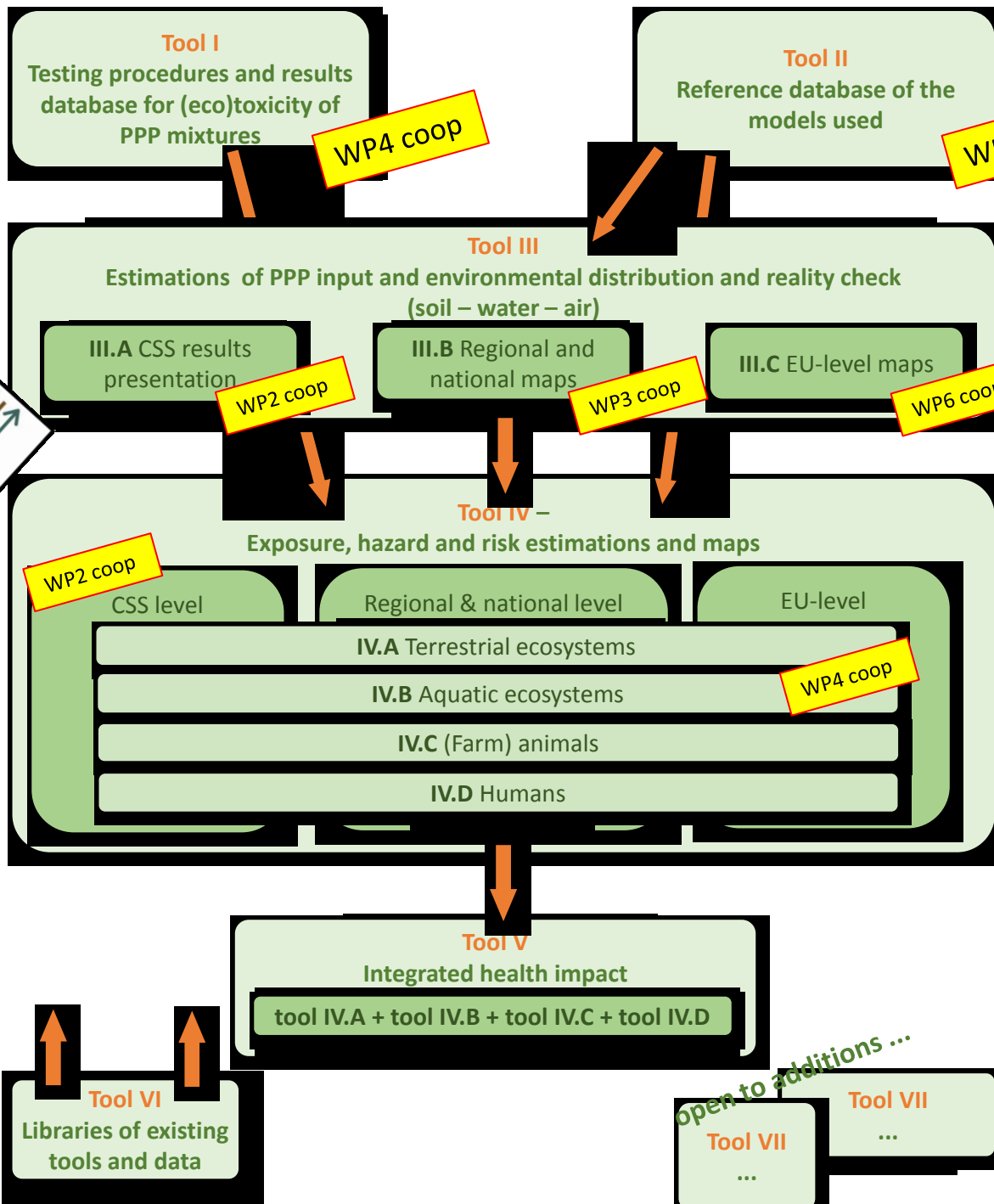
AQUATIC ECOSYSTEM



TERRESTRIAL ECOSYSTEM



Toolbox



All aboard the SPRINT transition train!

https://prezi.com/p/edit/3hrprgye_u6i/

Hledání a hodnocení cest přech

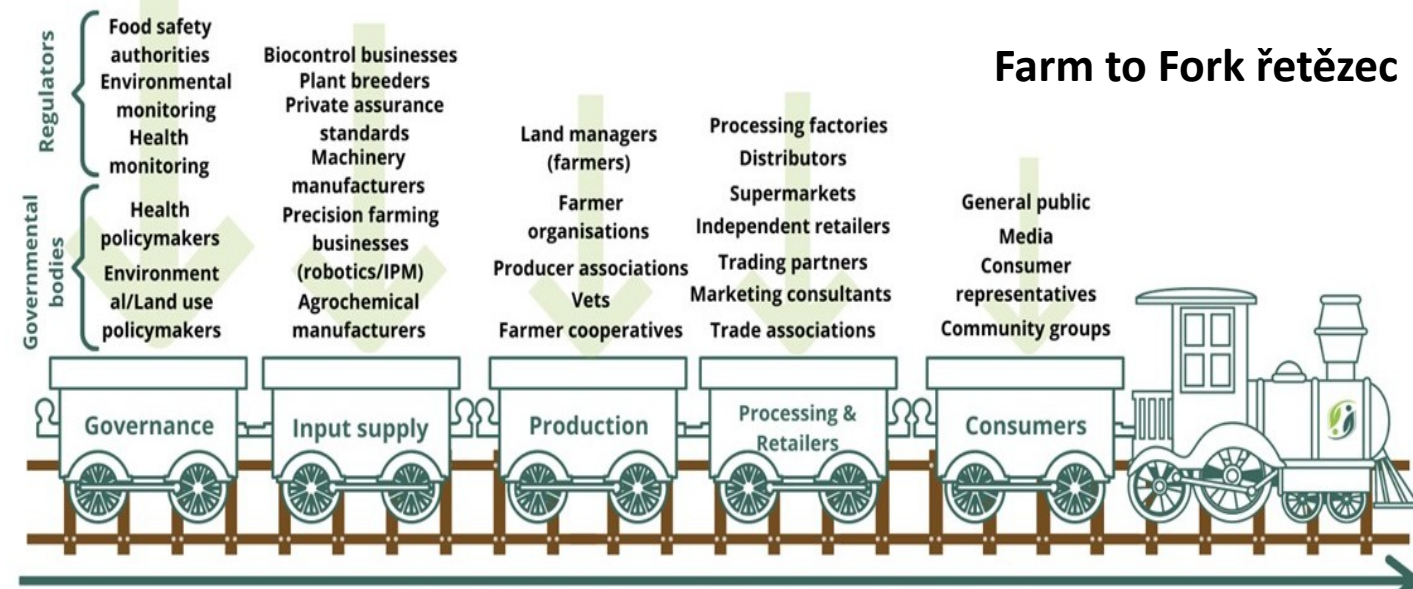
workshopy národní a mezinárodní
konzultace, zpětná vazba, doporučení
sdílení zkušeností, pohledů a informací

aby výzkum projektu

neztratil kontakt s realitou

reagoval na reálné potřeby a problémy

reflektoval různorodé pohledy a zájmy





H2020 project PAPILLONS
**Plastic in Agricultural Production: Impacts,
Lifecycles and LONG-term Sustainability**
(project [101000210](#))

<https://www.papillons-h2020.eu>

Call: SFS-21-2020: Emerging challenges for soil management

[B. \[2020\]: Emerging challenges for soil management: use of plastic in agriculture \(RIA\)](#)

Societal Challenges

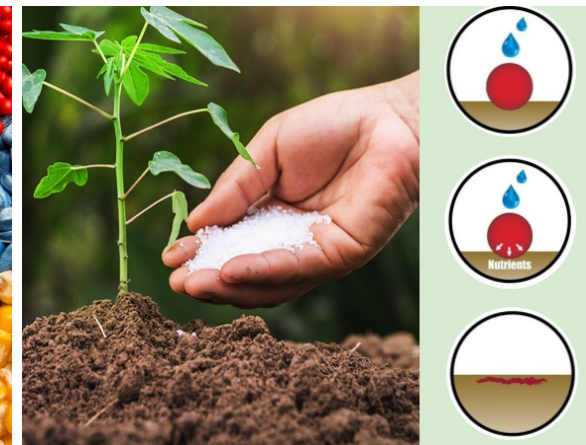
Food security, sustainable agriculture and forestry, marine, maritime and inland water research and the bioeconomy

Did you know?

plastics are used intensively in European agriculture

Why?

- increased yields
- earlier harvests
- less reliance on pesticides
- frost protection
- water conservation
- more efficient use of farm land
- higher quality of crops
- lower irrigation costs ...



Did you know?

- agricultural plastics (APs) are of environmental concern
 - 0.7-1 Mt/y waste from APs in Europe ¹
 - non-degradable APs represent over 90% of the current applications ²
- micro(nano)plastics - MNPs
 - during use and end-of-life APs degrade and generate fragments – MNPs
 - + polymer micro-encapsulation of agrochemicals (controlled-release) or seed coatings (5 – 40 kt/y ³)
 - + inputs from biosolid application (40-430 kt/y ⁴)
 - + illegal practices (AP waste disposed of in fields, landfills, buried in the soil or illegally burnt) ⁵



1 <https://doi.org/10.1177/0734242X13507968>

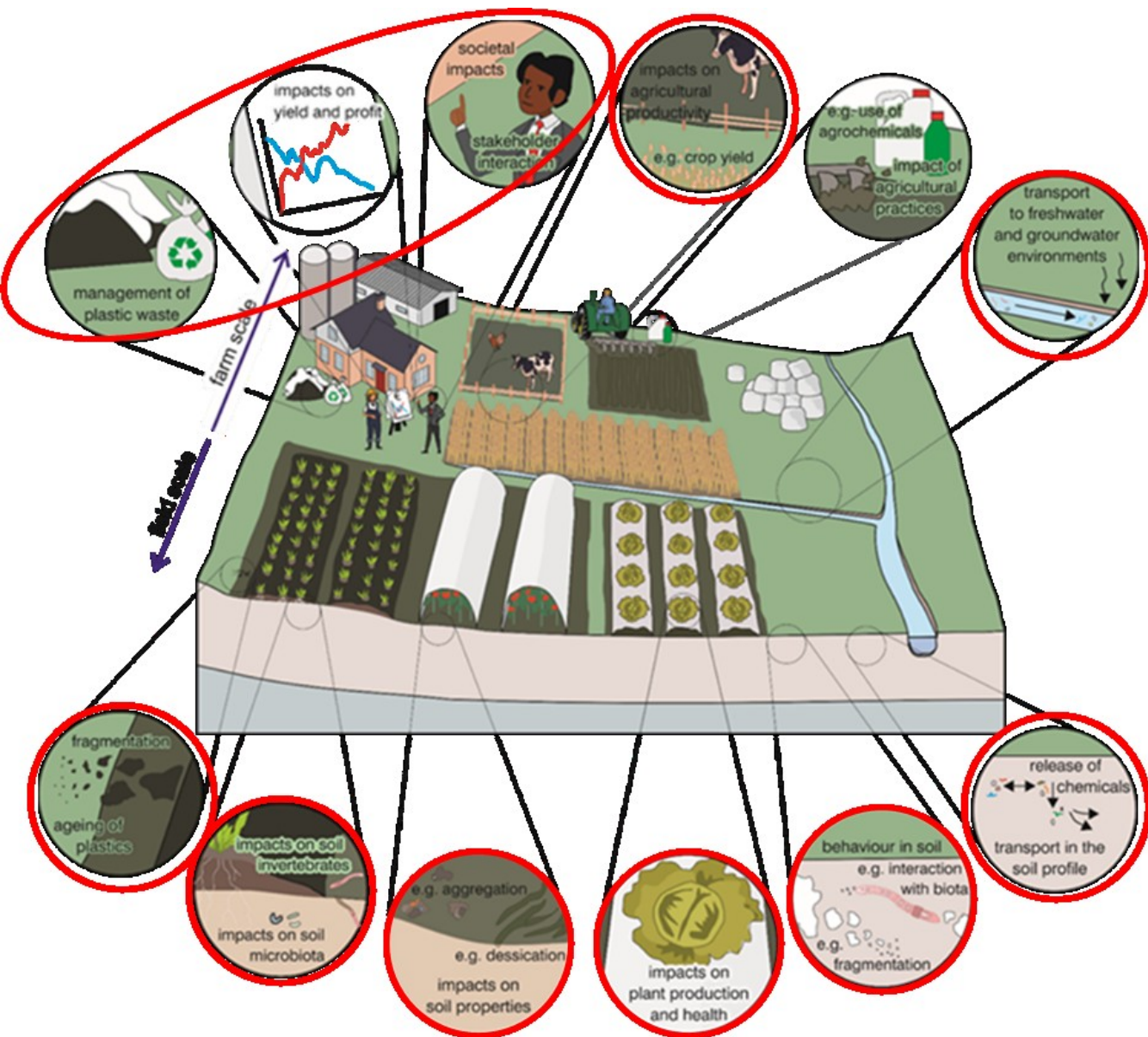
2 <https://doi.org/10.1111/j.1757-837X.2010.00061.x>

3 Papillons proposal review

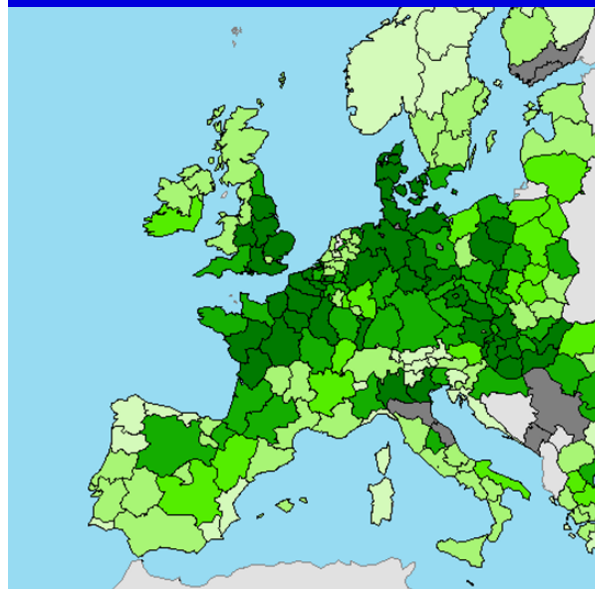
4 <https://doi.org/10.1021/acs.est.6b04140>

5 <https://doi.org/10.1038/s41598-018-36172-y>

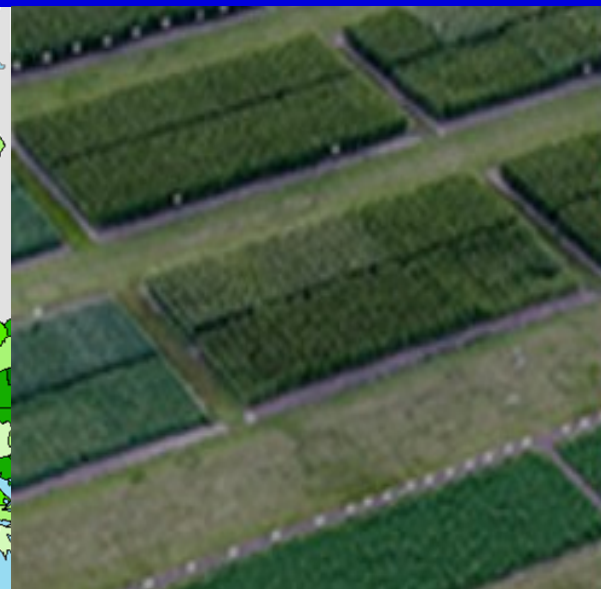
Planned research tasks



Spatial surveys



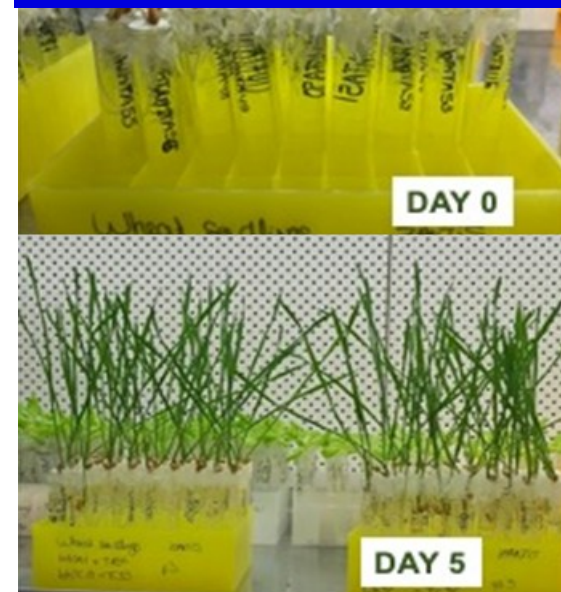
Field-scale experiments



Mesocosms experiments

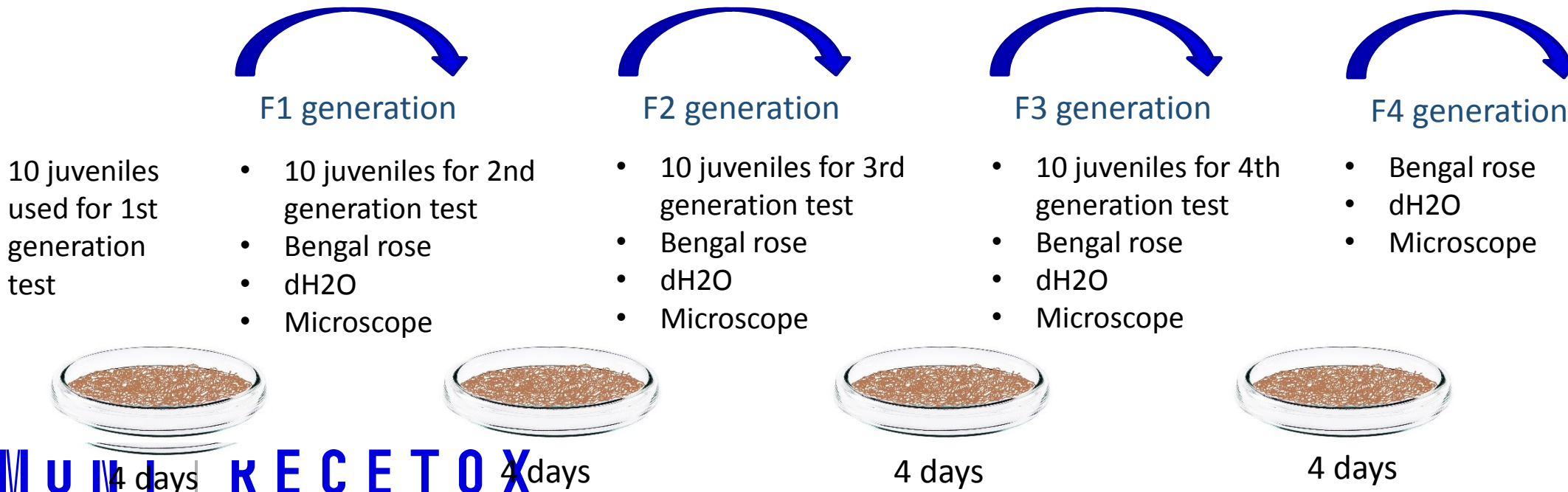
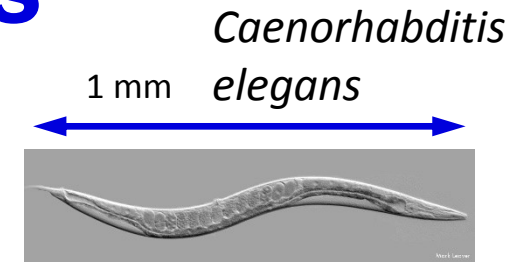


Lab experiments



Multigeneration test with nematodes

- Matrix: (un)contaminated soil (laboratory or field contaminated)
- Test organisms: *Caenorhabditis elegans*
- Evaluated result: number of juveniles per an adult
- Endpoints: ECx, LOEC, NOEC
- Test validity criteria: Survival of adults 80%, less than 10% of males in the controls, more than 30 juveniles per an adult in controls
- Norms (only reproduction test): ISO 10872 (2008), ASTM E 2172 – 01 (2010)



Multigeneration test with enchytraeids

- Matrix: (un)contaminated soil (laboratory or field contaminated)
- Test organisms: *Enchytraeus crypticus*, *E. albidus*
- Evaluated result: number of juveniles per an adult
- Endpoints: ECx, LOEC, NOEC
- Test validity criteria: Survival of adults \square 80%, more than 10 juveniles per an adult in controls
- Norms (only reproduction test): ISO 16387 (2004), OECD 220 (2004)

2 mm *Enchytraeus crypticus*



10 adults
used for 1st
generation
test



F1 generation

- 10 adults used for 2nd generation test
- Bengal rose
- Ethanol
- dH2O
- Photocamera



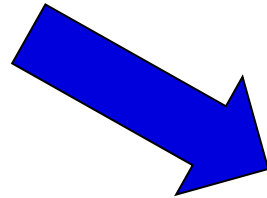
F2 generation

- Bengal rose
- Ethanol
- dH2O
- Photocamera



Agricultural plastics additives

- what additives are used dominantly in APs ?
- how to prioritize them ?
- how to analyze them ?
- what data are missing ?
- do they contribute to MNPs toxic effects ?
- etc etc



- what to analyze in the samples of EU survey ?
- what to apply and analyze in the field / microcosm / single species tests ?



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HE project BENCHMARKS
Building a European Network for the
Characterisation and Harmonisation of
Monitoring Approaches for Research and
Knowledge on Soils
(project 101000210)

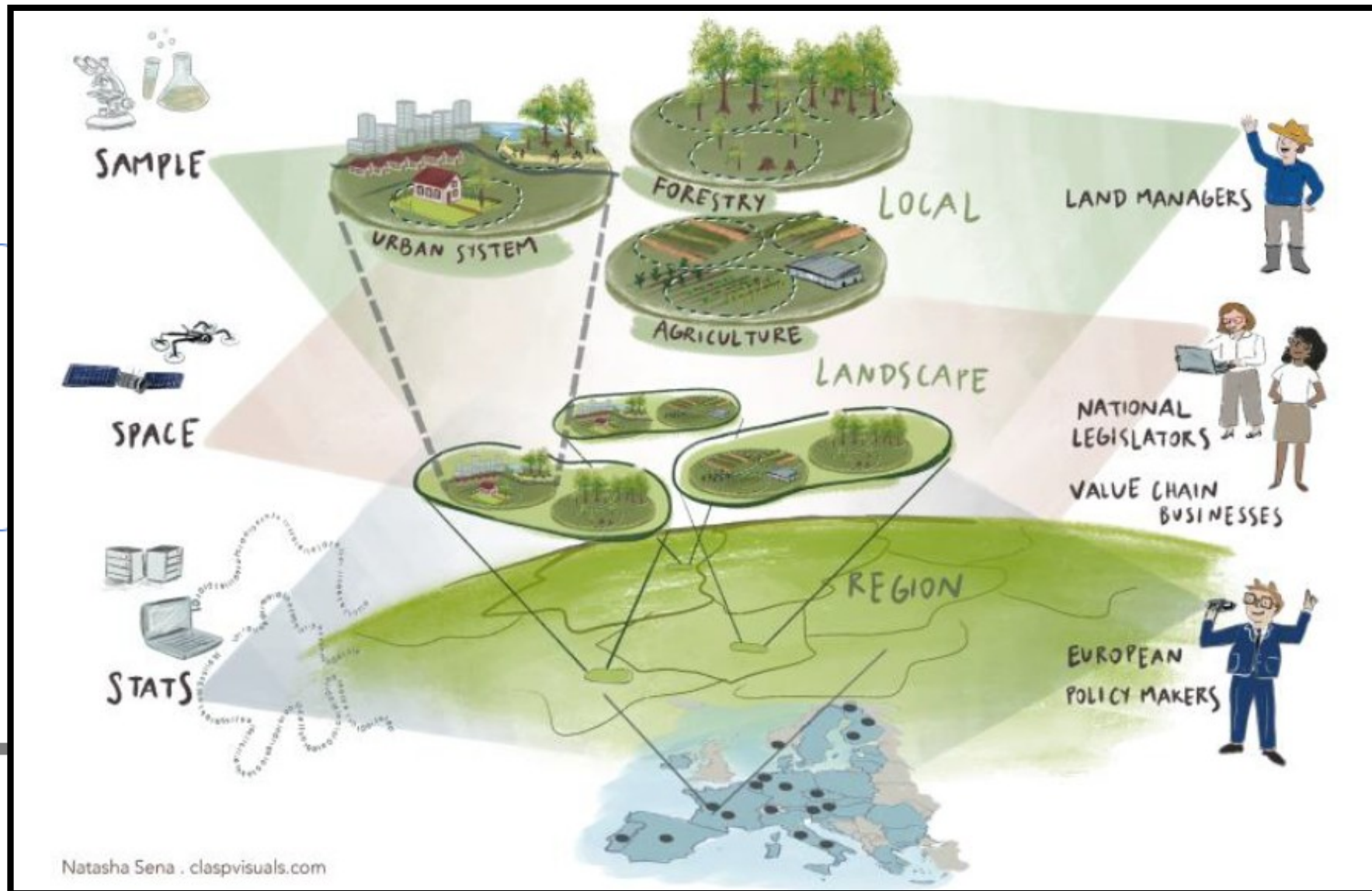
Call: [Research and Innovation and other actions to support the implementation of a mission in the area of Soil health and Food](#)

Topic: [Validating and further developing indicators for soil health and functions \(HORIZON-MISS-2021-SOIL-02-02\)](#)

Očekávané výstupy

- harmonizovaný a cenově efektivní rámec pro **měření půdního zdraví** – vývoj sady robustních **indikátorů** a souhrnného indexu půdního zdraví
- podpora **harmonizovaného půdního monitoringu a reportování v Evropě**
- významné zvýšení kapacit pro monitoring půdního zdraví s cílem **hodnotit dopady způsobů hospodaření a politických opatření**
- podpora **rozvoje politik a tvorby stimulů** pro udržitelné hospodaření na půdě díky jasnému prokazování vztahů mezi **půdním zdravím, půdními funkcemi a ekosystémovými službami**

projekt BENCHMARKS



Existing 8 EU Mission indicators and datasets

TRL 2-3

Key impacts

- Scientific: Framework for soil health in Europe to support soil strategy and SH&F mission
- Economic: Integration of soil health assessment into sustainability strategies for businesses of 24 value-chains
- Societal: 480 land managers engaged towards 75% healthy soils by 2030

TRL 4-5

SPECIFIC NEEDS

A soil health monitoring framework that supports a **harmonised reporting structure** at EU, national and local levels for soil health

Better scientific knowledge on the suitability and reliability of the SH&F indicator measurements.

Demand from European policy for support in ensuring 75% healthy soils across Europe by 2030 in line with Green Deal commitments and targets

Need for scientific underpinning of soil health initiatives by value-chain businesses.

EXPECTED RESULTS

Harmonised and cost-effective soil health monitoring framework: through co-development and testing in 24 Living Labs

Multi-scale monitoring system: using sample, stats and space indicator measurements for state and change assessment, with appropriate proxy indicators for assessment at coarser scales.

Soil indicator selection tool, benchmarking and soil health index for inclusion in the soil health dashboard to support to the SH&F mission and JRC in achieving soil health targets by 2030.

Mainstream soil health monitoring: through scientific underpinning of value-chain soil health incentivisation programmes.

D & E & C MEASURES

24 Living Labs to co-design the framework and test the indicators to **build trust and knowledge with stakeholders** in 17 regions of Europe.

Accessible and widely-understandable (translated) scientific and technical knowledge, shared through a range of multi-media resources, open-source journals, video blogs by users and citizen science tools. Linking to other soil mission resources and projects through online media channels.

Jointly assess exploitation measures with the EC and JRC to embed soil health monitoring across Europe to support the soil strategy and soil health law.

Engage with 24 value-chain businesses in the Living Labs to mainstream soil health programmes and incentivise sustainable soil management.

TARGET GROUPS

Land managers: Farmers, Foresters, Land planners, citizens

Public actors: policy makers, planners, multi-level governance

Private actors: advisory services, technologists, value-chain businesses, NGOs.

Knowledge Institutes: Universities, research institutions, Secondary education

OUTCOMES

A harmonised and cost-effective framework for measuring soil health, based on a widely agreed definition of soil health to support the further development of European policy.

Review of SH&F and BENCHMARKS proposed indicators tested in the 24 Living Labs (with > 480 land managers) to significantly improve capacities for soil health assessment by 2026

Provide the scientific evidence **on the links between soil health, soil functions and ecosystem services in an integrated soil health tool** to be included in the EC Soil Health Dashboard

Provide the scientific underpinning of **soil health incentivisation schemes** to be adopted by 24 value-chain businesses.

IMPACTS

Scientific: evidence on the soil health indicators proposed by the SH&F Mission and Benchmarks to support policy developments and monitoring, verification and reporting in Europe as aimed for by the new EU Soil Strategy and proposed Soil Health Law by 2030.

Economic: Integration of scientific models into sustainability strategies of 24 businesses of value-chains for deployment in the future.

Societal: to achieve the transition towards 75% healthy soils by 2030 for food, people, nature and climate. By increasing adoption of sustainable soil management to ensure; food quality, clean water, habitats for biodiversity, climate resilience and support a wider range of ecosystem services in rural and urban landscapes.

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Díky za pozornost

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