

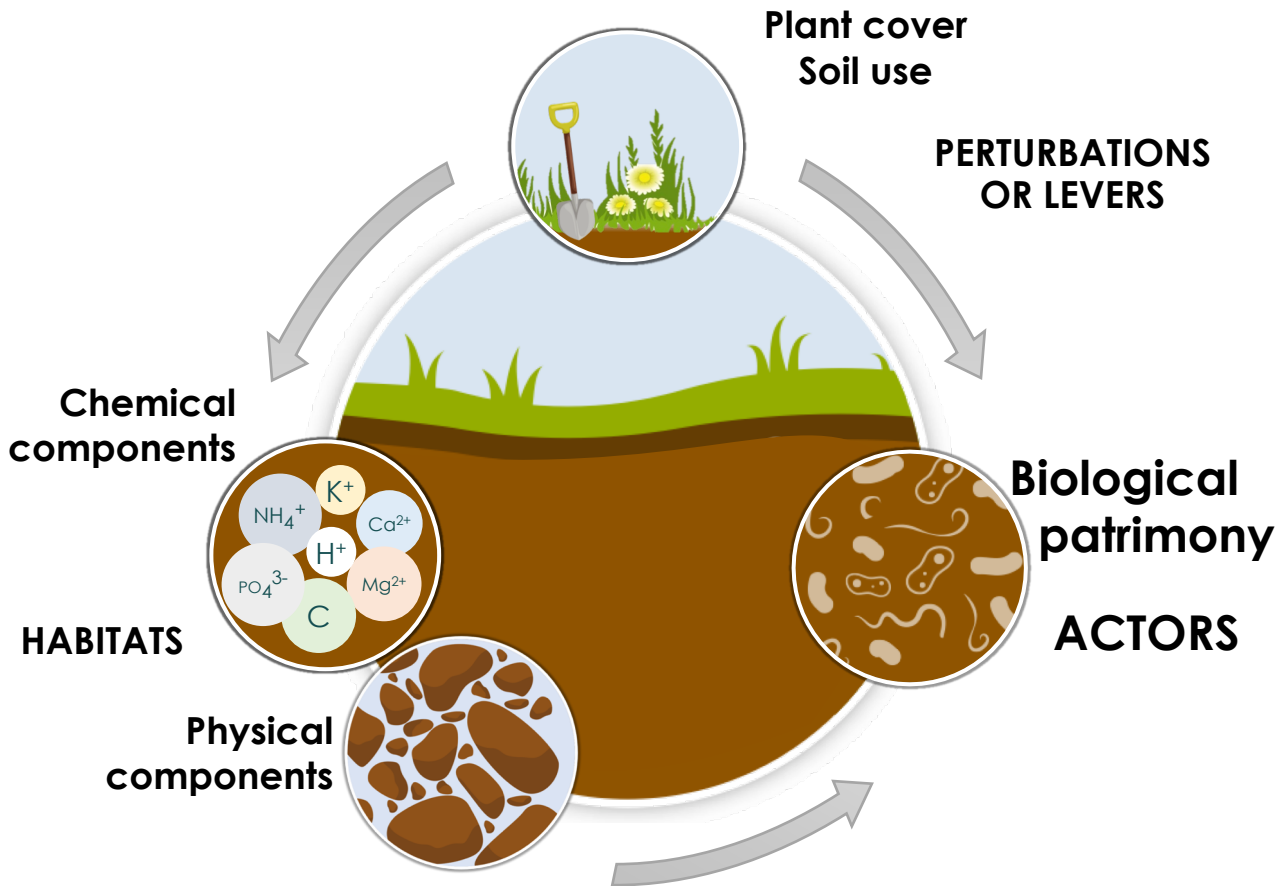
## Session : Le sol, une opportunité pour l'environnement

# Evaluation de la qualité écologique des sols grâce à des référentiels nationaux et à une expertise issus de la recherche académique

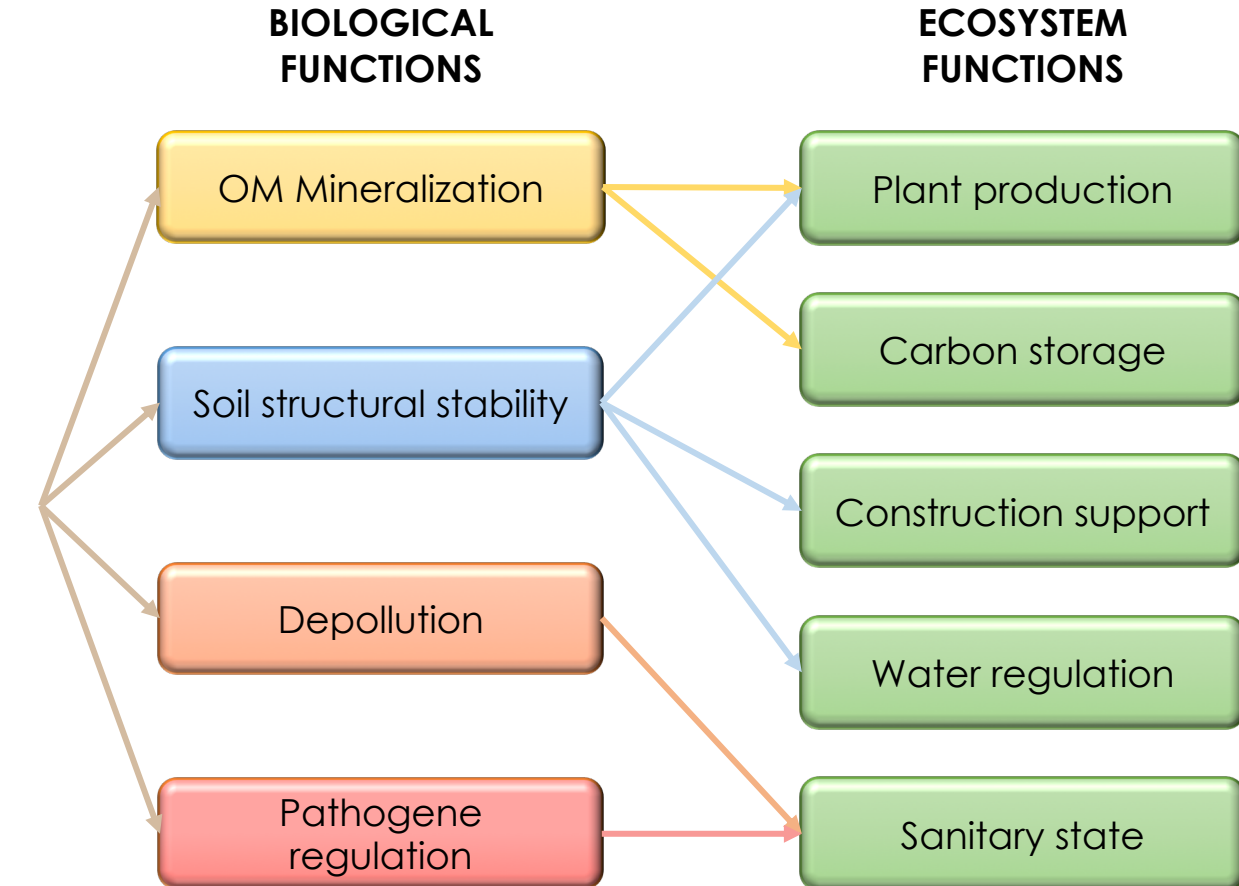
Battle KARIMI  
Directrice scientifique  
[battle.karimi@novasol-experts.com](mailto:battle.karimi@novasol-experts.com)

# From the soil ecology to the soil quality

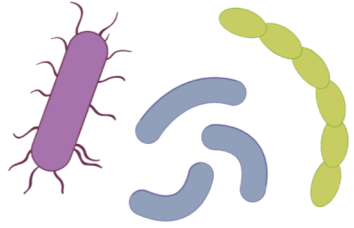
## Soil ecology



## Soil quality



# The microorganisms, indicators of soil quality



## BACTERIA

$10^9$  individuals  
 $10^6$  species

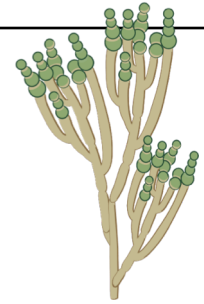


1 gr. of soil



## FUNGI

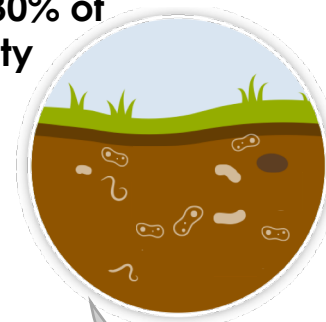
$10^6$  individuals  
 $10^3$  species



Experimental  
demonstrations

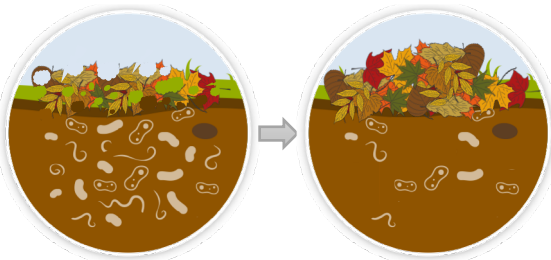
**INRAE**

Decrease of 30% of  
biodiversity

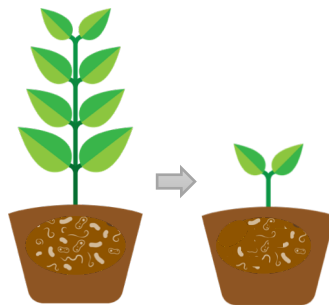


Consequences on soil  
functions and  
sustainability

-40% OM mineralization

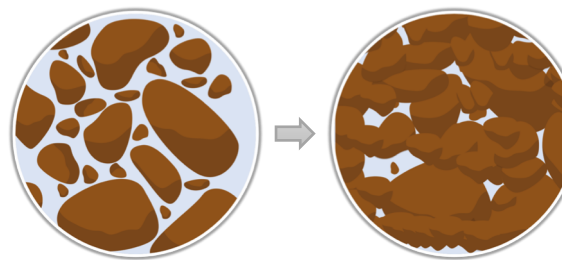


-50% plant productivity



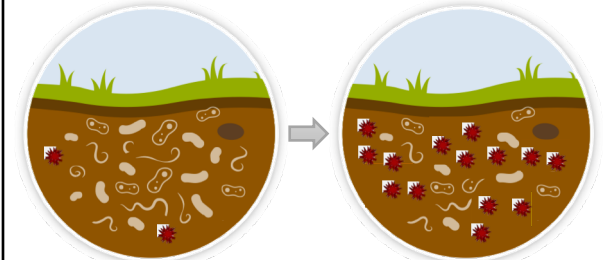
**BIOLOGICAL FERTILITY**

-50% soil structural  
stability



**PHYSICAL FERTILITY**

X5 survival time of  
pathogens



**SANITARY STATE**



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# A national reference for the soil quality

## The French Network of Soil Quality Monitoring (RMQS)



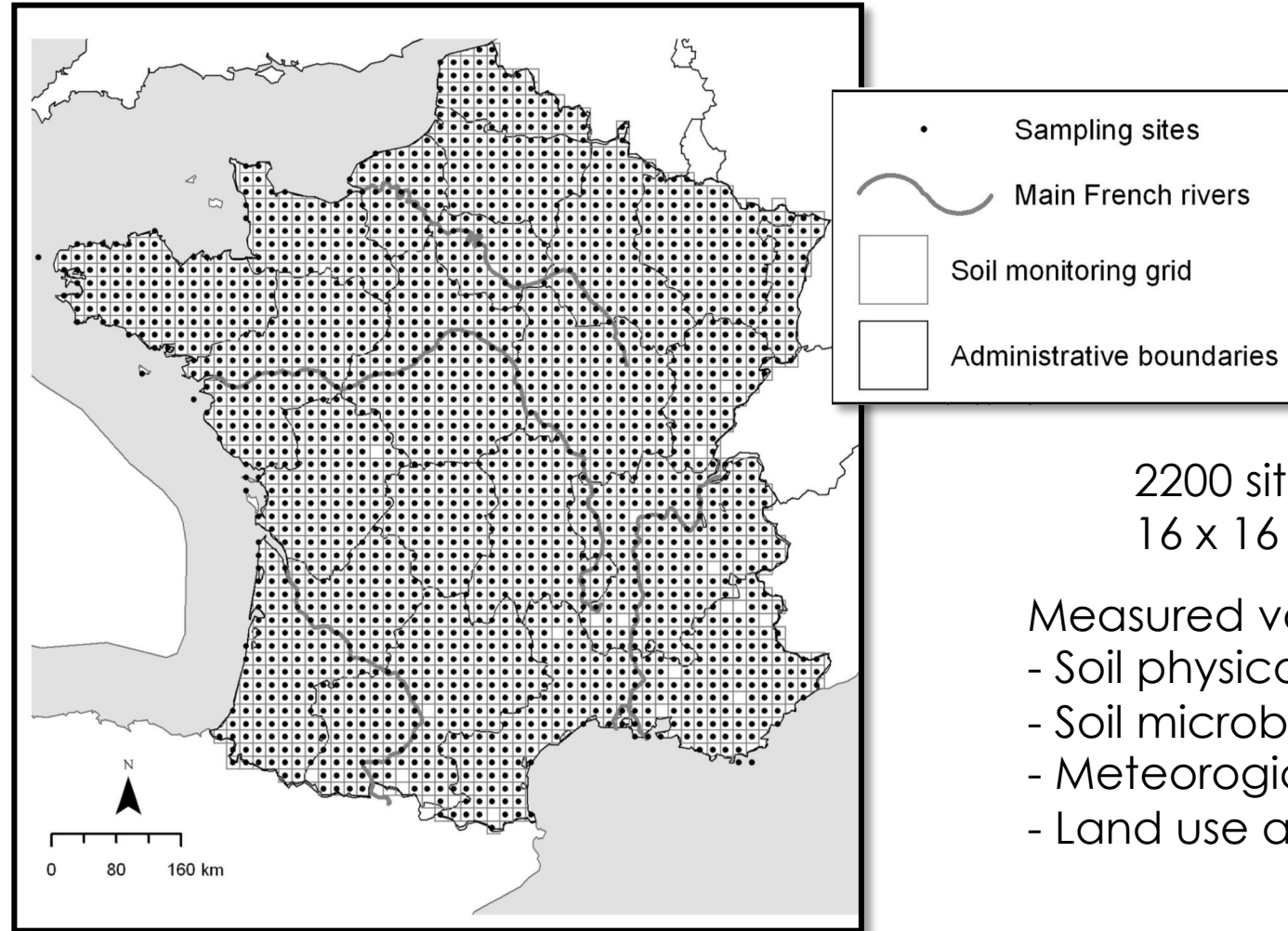
INSTITUT NATIONAL  
DE L'INFORMATION  
GÉOGRAPHIQUE  
ET FORESTIÈRE



Institut de Recherche  
pour le Développement  
FRANCE



MINISTÈRE  
DE L'AGRICULTURE  
DE L'AGROALIMENTAIRE  
ET DE LA FORÊT



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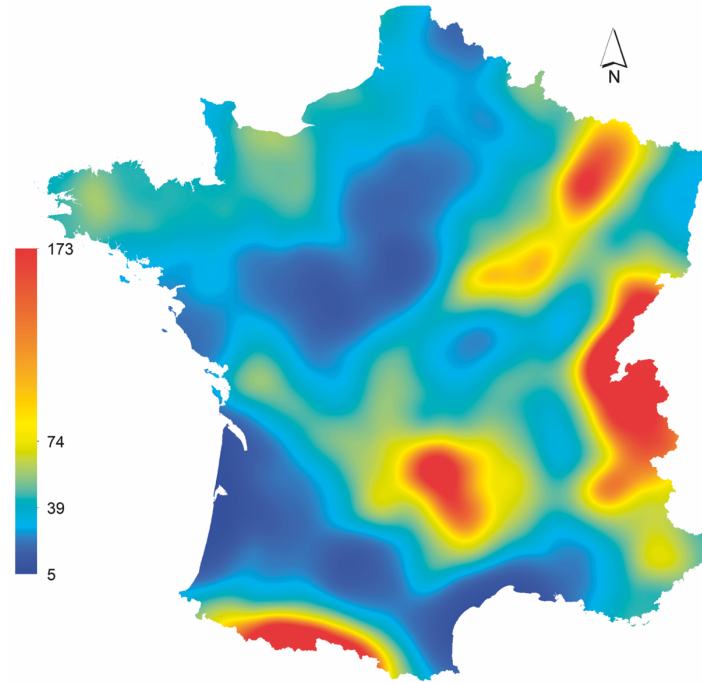
# The research advances in soil microbiology



Knowledge and expertise



Operational bioindicators

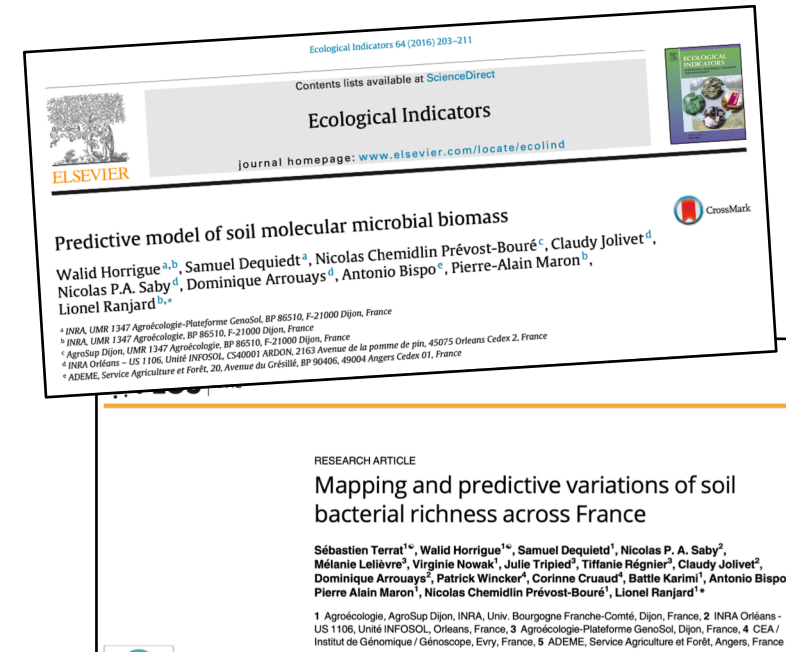


« Soil national indicator »



Diagnostic tools

$$Y = \beta_0 + \sum (\beta_j X_j + \beta_j X_j^2) + \sum \sum \beta_{jk} X_j X_k + \epsilon$$



# What user needs in the field of soil quality?



➡ **Expertise in microbial ecology and agroecology**

# Novasol Experts – Who are we ?

## A consulting office for an innovative assessment of the soil ecological quality

C. Guillard  
CEO



B. Karimi  
Scientific Dir.



Scientific contribution of 3 researchers

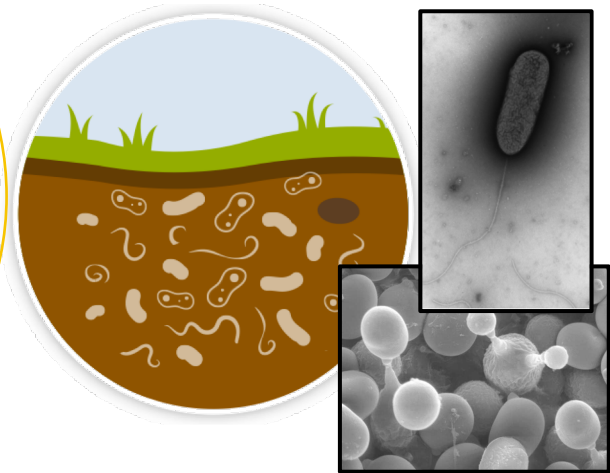
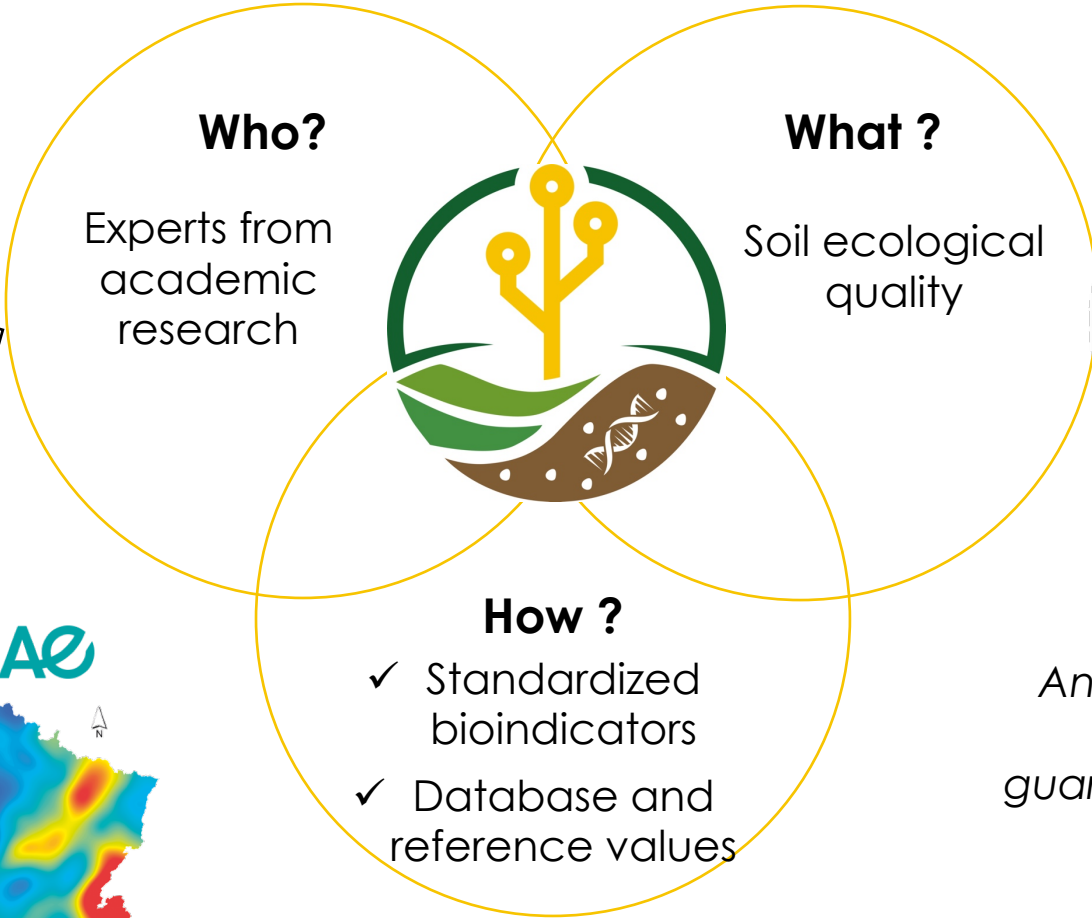




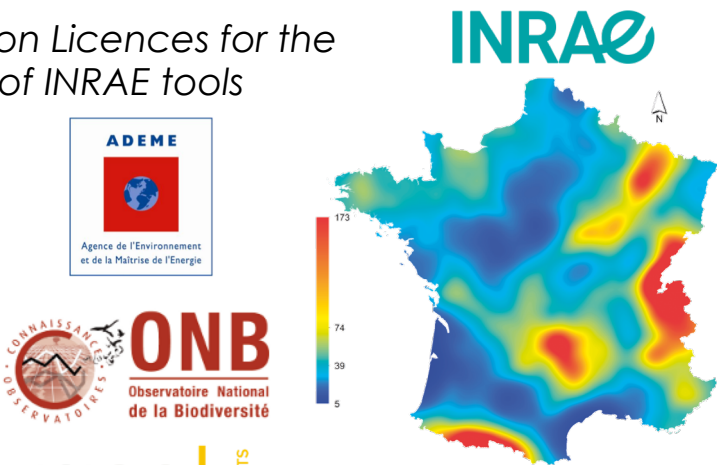


L. Ranjard   PA. Maron   S. Dequiedt

Research Dir.   Research Dir.   Engineer



Exploitation Licences for the use of INRAE tools

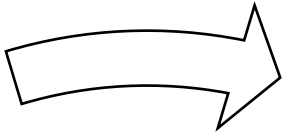


An abundant and diversified biological patrimony guarantees the soil sustainability

# Our services

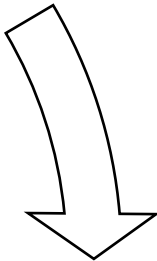
## Analysis of needs

Issue, context, expectations, constraints



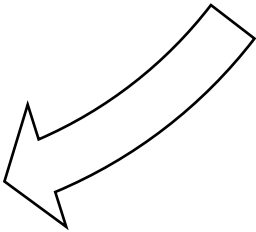
## Development of study strategies

The quality of results depends entirely on the choices made at the implementation of the study

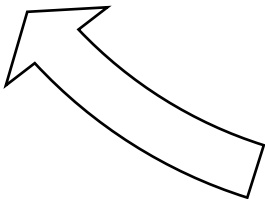


## Scientific expertise

Establish and interpret a diagnosis



R & D



## Formation and Communication

Training on soil biodiversity according the demand

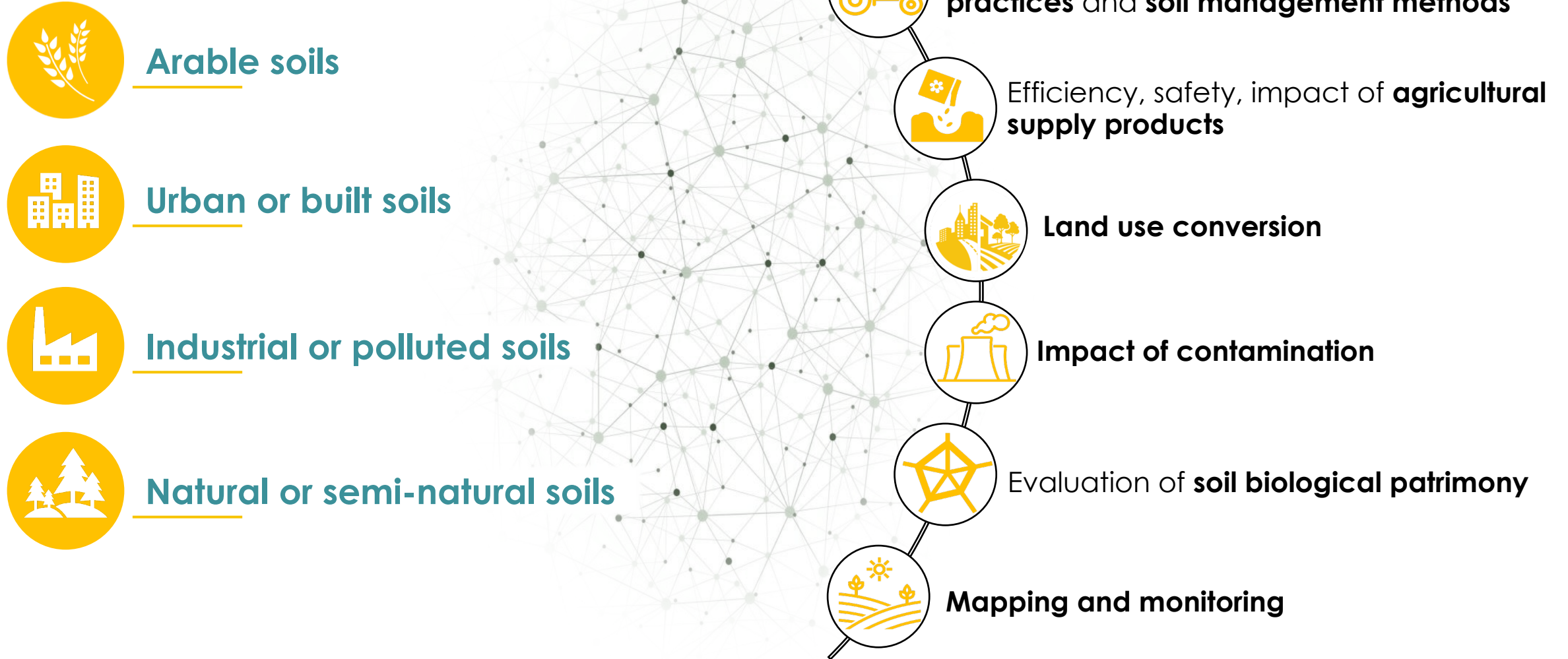
Communication in FR and EN in various formats



Depuis 2021



# For who and for what ?



# Some examples of project

## 1. Assessment of the impact of agroecological practices on the soil biodiversity



Confirm the relevance of the actions  
Feed the reflections of farmers  
Support the transition

### Winter management of vineyards inter-rows by sowing green manure as grass cover



Conclusion :

→ No significant impact of green manure on soil organic carbon and nitrogen after 4 years

→ But stimulating effect of green manure on microbial biomass. Unable to prioritize the different green manures at this term.

### Molecular Microbial biomass

Critical thresh.      Reference value

Faba bean

◆ ◆ ◆  
1 2 3

+12 à +34%

Vetch - Oats

◆ ◆ ◆  
1 2 3

+12 à +43%

Control

◆ ◆ ◆  
2 1 3

-30 à -2%

### Fungi/Bacteria Balance

Imbalance in  
favor of bacteria

1%

Optimum

5%

Imbalance in  
favor of fungi

Faba bean

◆ 5.7 à 7.4

Vetch - Oats

◆ 6.5 à 8.9

Control

◆ 6.0 à 7.2



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# Some examples of project

## 2. CCTP (Technical Clauses Specifications ) expertise of urban development project



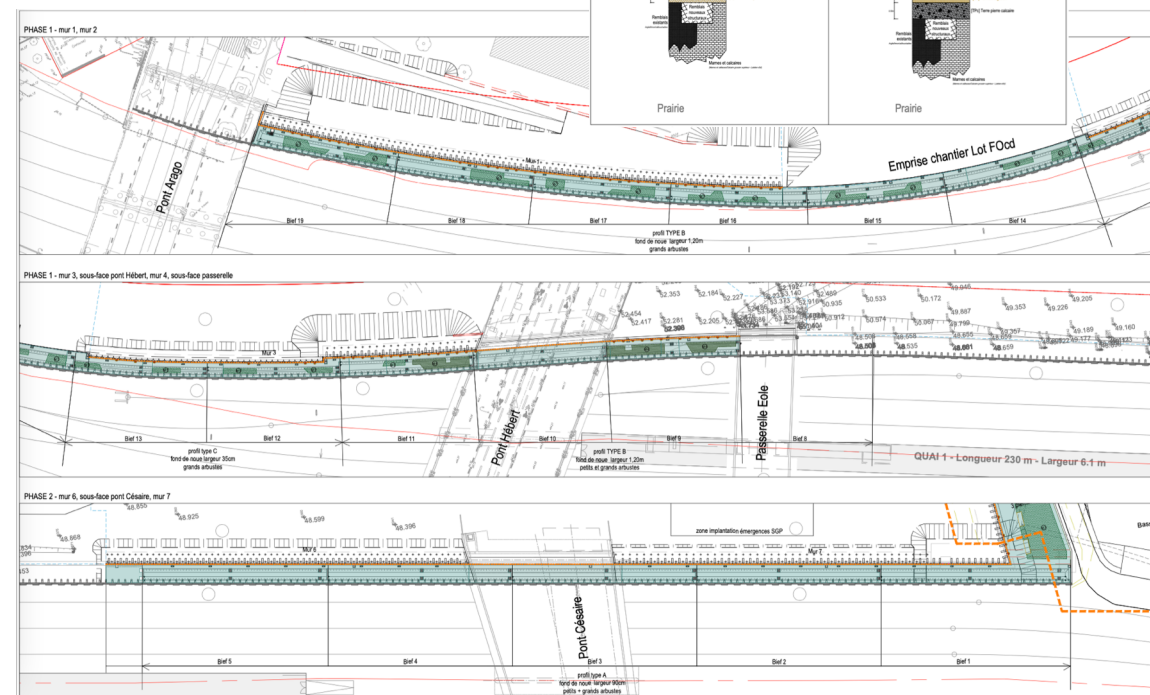
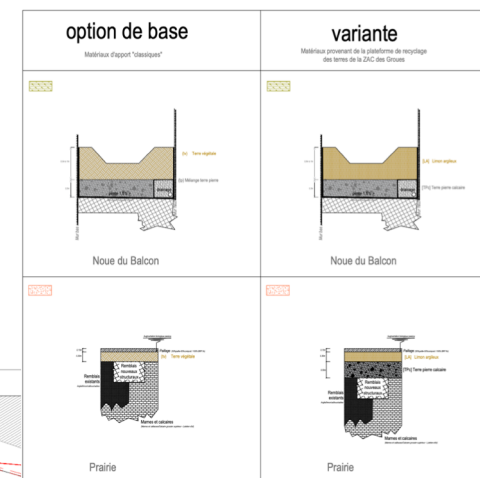
Validate the actions planned for the site installation, for its monitoring and its management

**Establishment of a valley to sustainably promote the biodiversity (flora, fauna, soil)**

Conclusion :

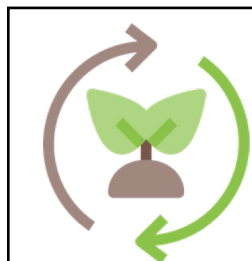
→ Prioritize the potential of local substrates and an appropriate management rather than the biological inoculation into the soil

→ Plan for medium-term monitoring to confirm the expected results of the actions



# Some examples of project

## 3. Evaluation of the soil biological quality in brownfields/wastelands under rehabilitation

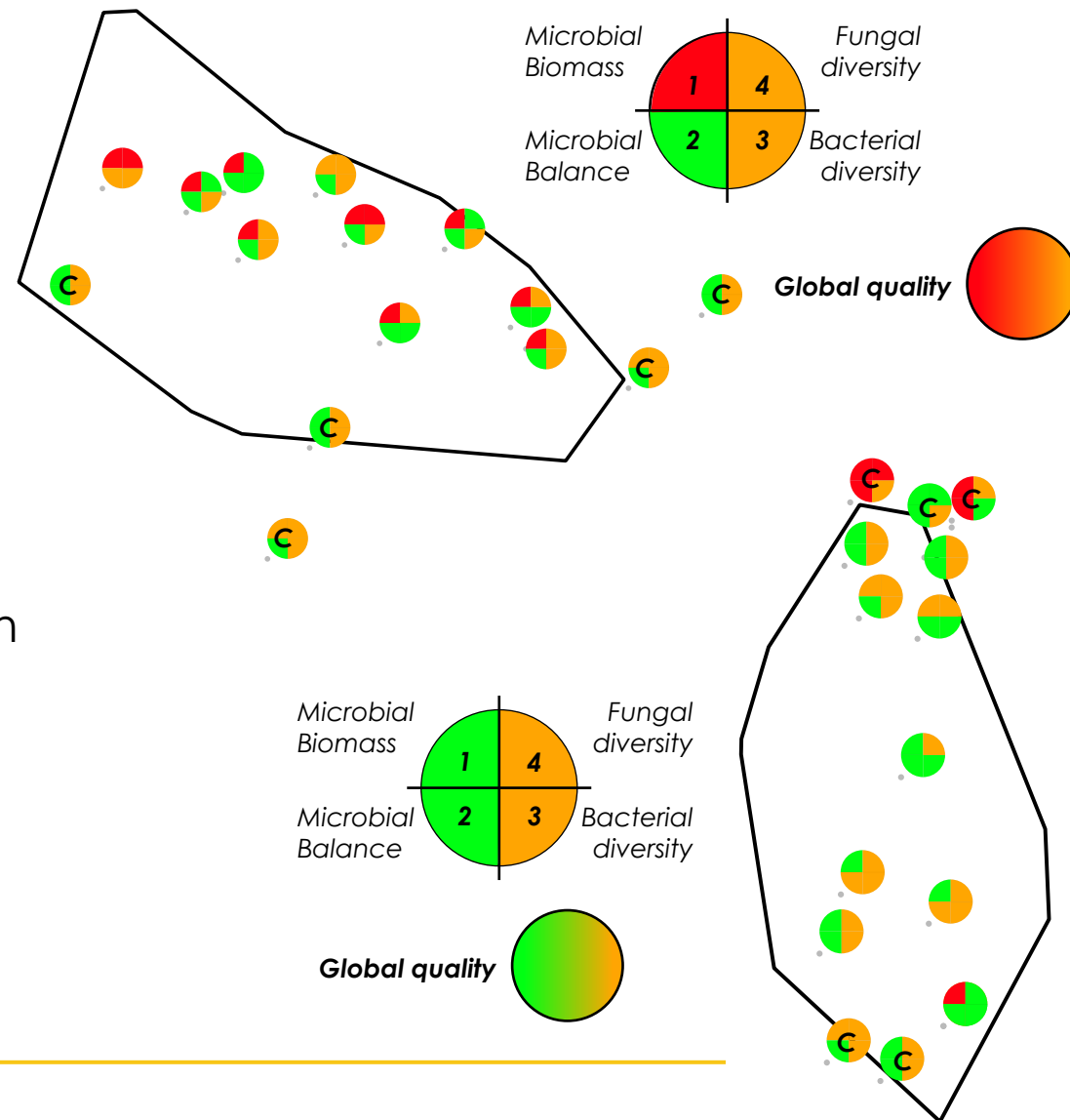


Conclude on the effective rehabilitation of soils  
Determine the potential for the future use as arable soils

**Rehabilitation of soils in 2019/2020 for a future agricultural use.**

Conclusion :

- High heterogeneity of soil microbiological quality within certain sites
- Quality comparable to local control zones (forest or arable soils)





# Some examples of project

## 4. Organization of formations in soil biology and agroecology



Provide resources from  
academic research and  
experience to soil users

- **Be aware** of the importance of the soil ecological quality for the agricultural production
- **Identify** the impact of agricultural practices on the soil microorganisms
- **Be informed** on the new tools for the soil quality diagnostic result developed by scientific research

→ Speakers from different research institutes (INRAE, ISARA) and consulting office

→ 3 days of seminars, discussion, field and lab visits and serious game !

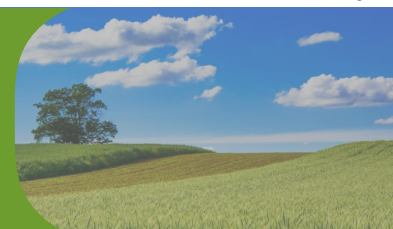


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### FORMATION

Du 13 au 16 décembre 2021 à Dijon

#### LA MICROBIOLOGIE DES SOLS AU SERVICE D'UNE PRODUCTION AGRICOLE DURABLE



##### POUR QUI ?

- Agriculteurs, Viticulteurs, Eleveurs
- Conseillers agricoles, techniciens, animateurs, technico-commerciaux, ingénieurs agronomes
- Bureaux d'études, formateurs, enseignants

##### PREREQUIS

Aucun prérequis nécessaire

##### LE PROGRAMME : 6 modules

1. Introduction au sol et à l'écologie du sol
2. La qualité microbiologique des sols agricoles : Inventaire national, fertilité biologique des sols et impacts des pratiques agricoles
3. Visite terrain : plateforme expérimentale INRAE, description d'un profil de sol
4. Les microorganismes du sol pour le meilleur et pour le pire : pathogènes, biocontrôle et biostimulants
5. MYMYX : comprendre les interactions plantes-biodiversité du sol par le jeu
6. Visite des plateformes techniques INRAE pour l'agroécologie et le sol.

##### TARIFS

1500 € HT pour trois jours de formations (21 h)



Nos formations sont accessibles aux personnes à mobilités réduites. Pour toute difficulté ou handicap, veuillez contacter le responsable de la formation.

##### NOUS CONTACTER

Novasol Experts - 64 A rue Sully,  
Maison Régionale de l'Innovation - 21000 DIJON  
[www.novasol-experts.com](http://www.novasol-experts.com)

##### LES OBJECTIFS

Maîtriser l'intérêt de la qualité écologique des sols pour la production agricole durable

Identifier l'impact des pratiques agricoles sur le patrimoine microbiologique des sols

Connaître les nouveaux outils de diagnostic de la qualité microbiologique des sols issus de la recherche scientifique

##### LES INTERVENANTS

Lionel RANJARD  
Pierre-Alain MARON  
Samuel DEQUIEDT  
Stéphane CORDEAU  
Marie CHAVE

INRAE

AGRENE

Claude ALABOUVETTE  
Wafa ACHOUAK  
Jean-François VIAN

CNRS isara

##### LES OUTILS PÉDAGOGIQUES

Alternance d'apports théoriques, d'échanges avec les participants et de mises en situation (serious game, terrain), enquête et quiz d'évaluation en fin de formation

Visites d'infrastructures de recherche, plateforme expérimentale et laboratoires

Responsable de la formation Charles Guillard  
[charles.guillard@novasol-experts.com](mailto:charles.guillard@novasol-experts.com)  
Tél : 06.73.51.63.46

SAS NOVASOL EXPERTS - Code NAF (APE) 7490B - Siret : 88340912000010 - Numéro de déclaration d'activité à la préfecture de Dijon : 27210422121



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# Thank you for your attention



Website : [novasol-experts.com](http://novasol-experts.com)

Contact : [contact@novasol-experts.com](mailto:contact@novasol-experts.com)