INRAE
la science pour la vie, l'humain, la terre

PHIM Plant Health Institute Montpellier

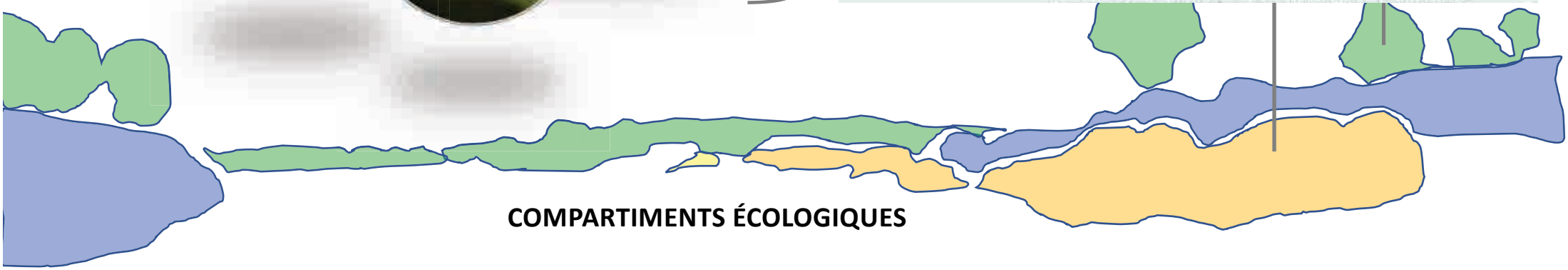
Institut
Santé
des plantes
Montpellier

Nicolas Sauvion

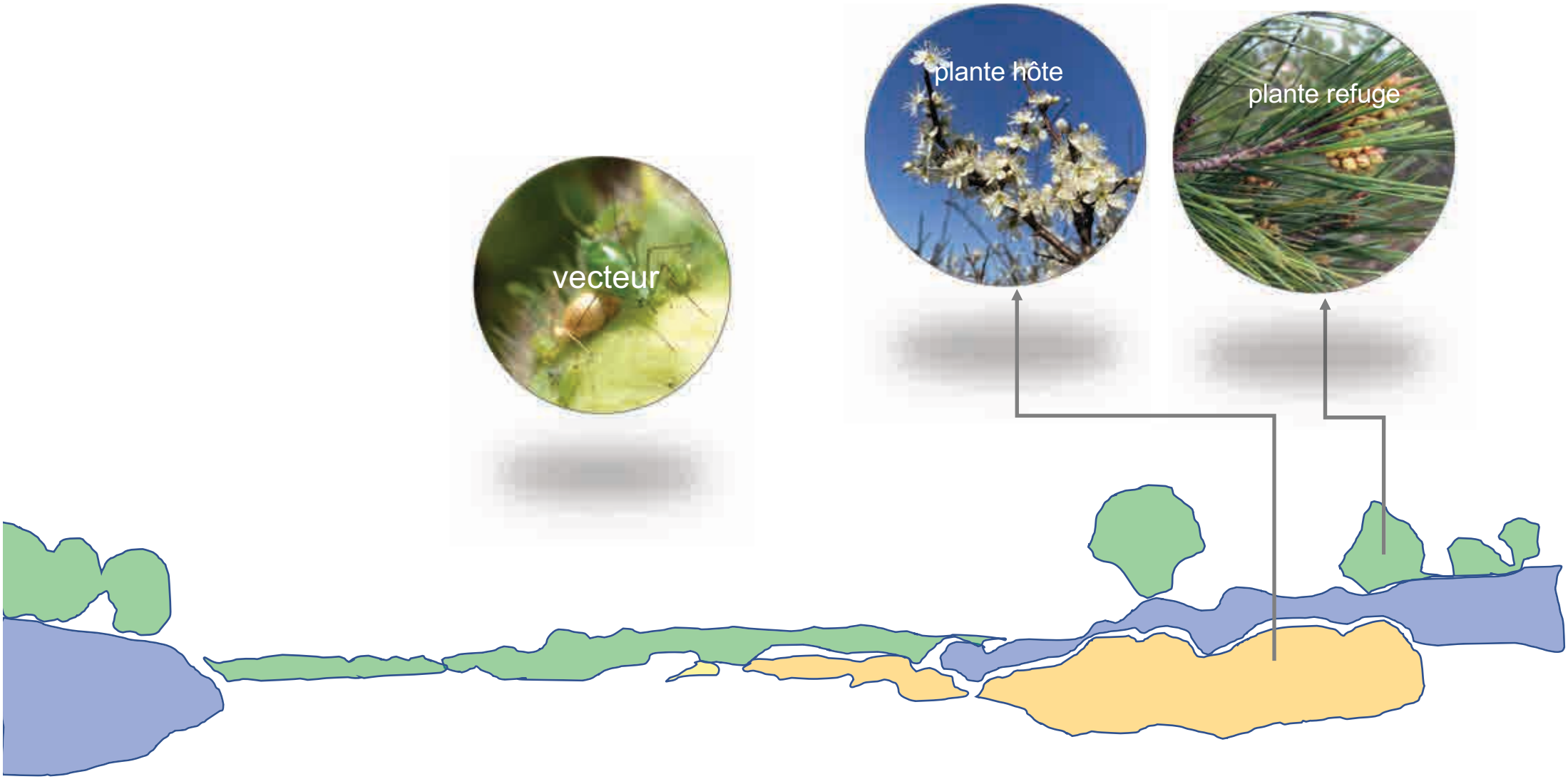
Ingénieur de Recherche
Entomologiste
Epidémiologiste

Entomologiste ?

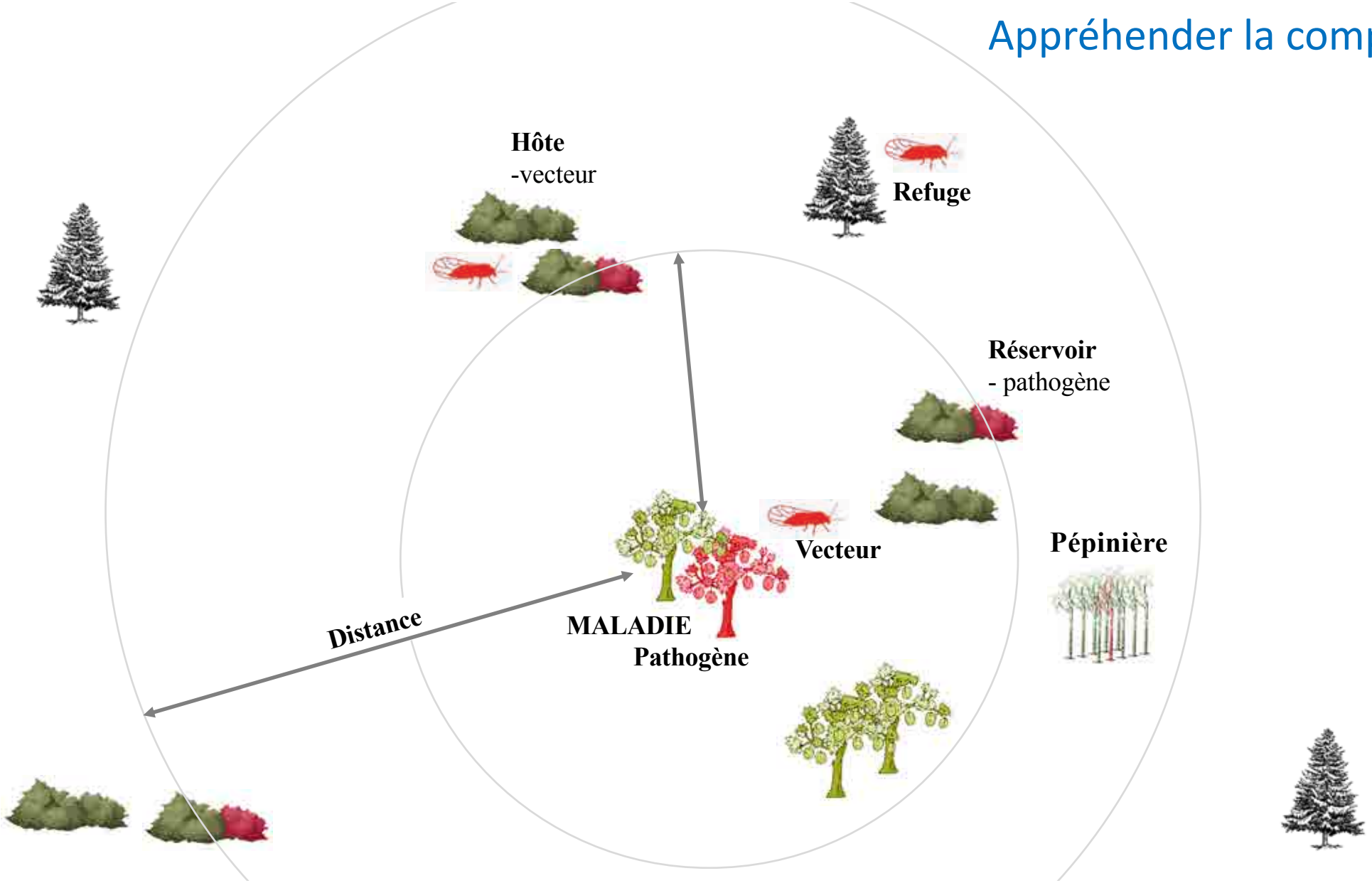
INTERACTIONS BIOLOGIQUES



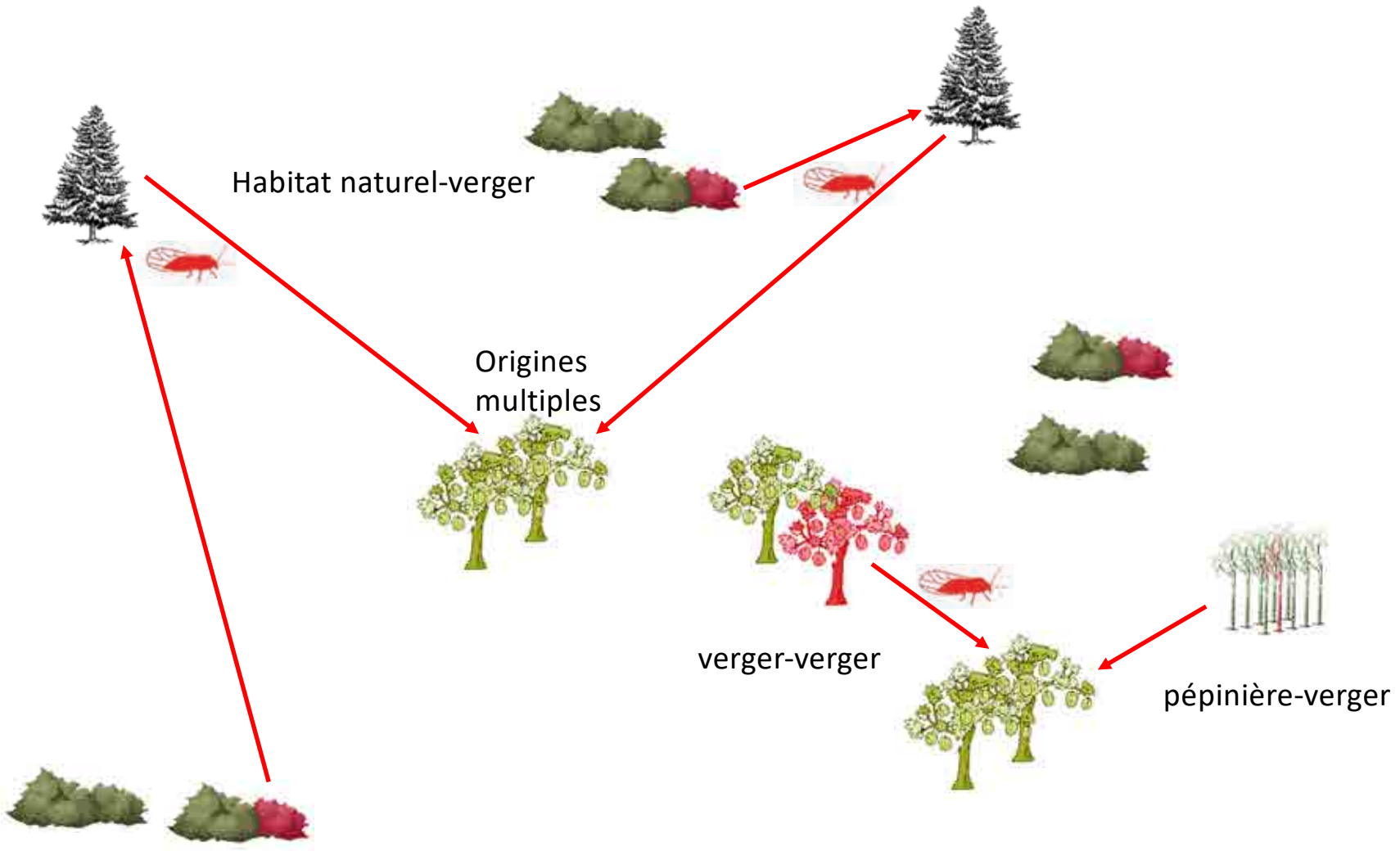
COMPARTIMENTS ÉCOLOGIQUES


plante hôte
plante refuge
vecteur

Appréhender la complexité

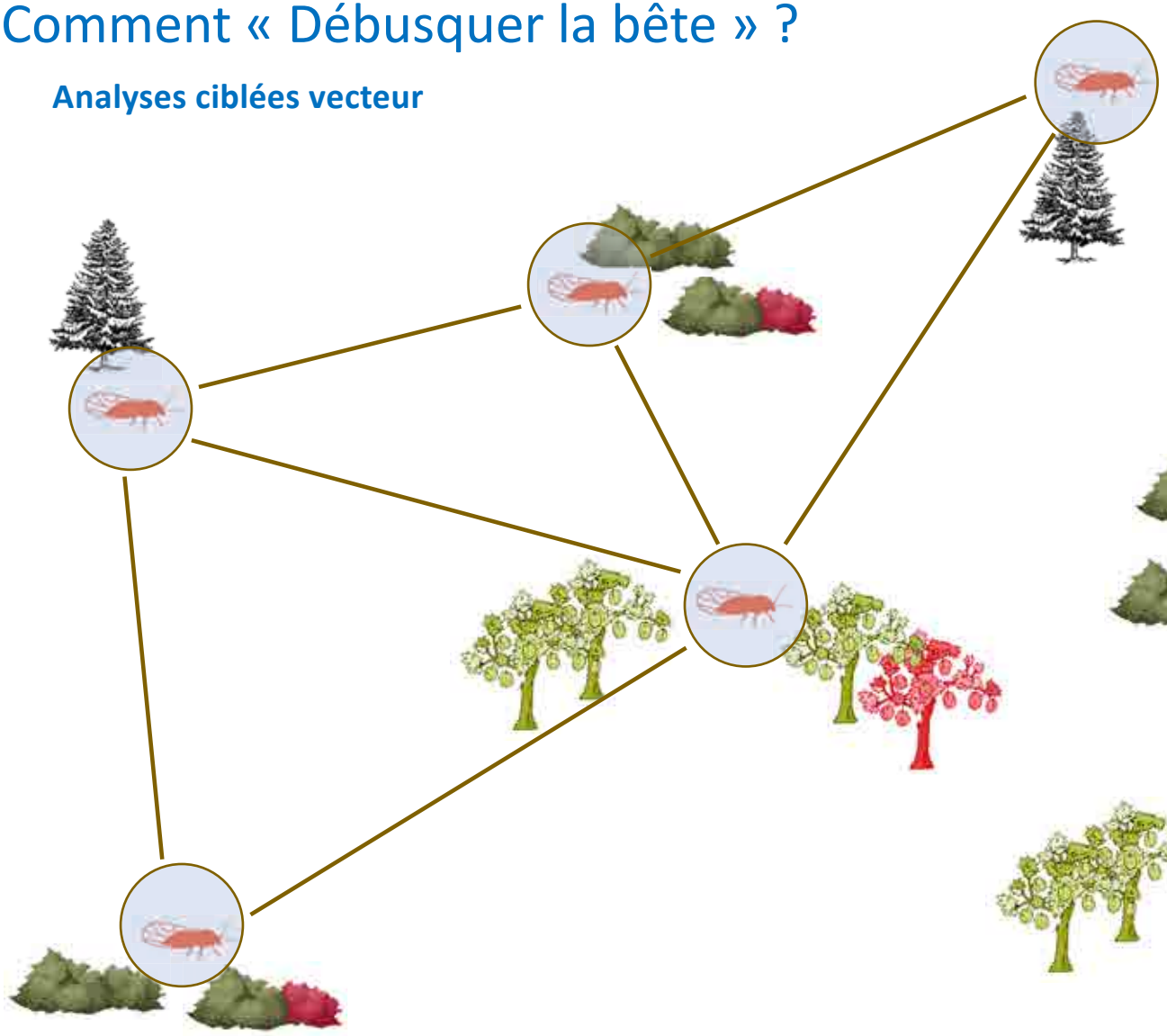


Liens potentiels ?



Comment « Débusquer la bête » ?

Analyses ciblées vecteur



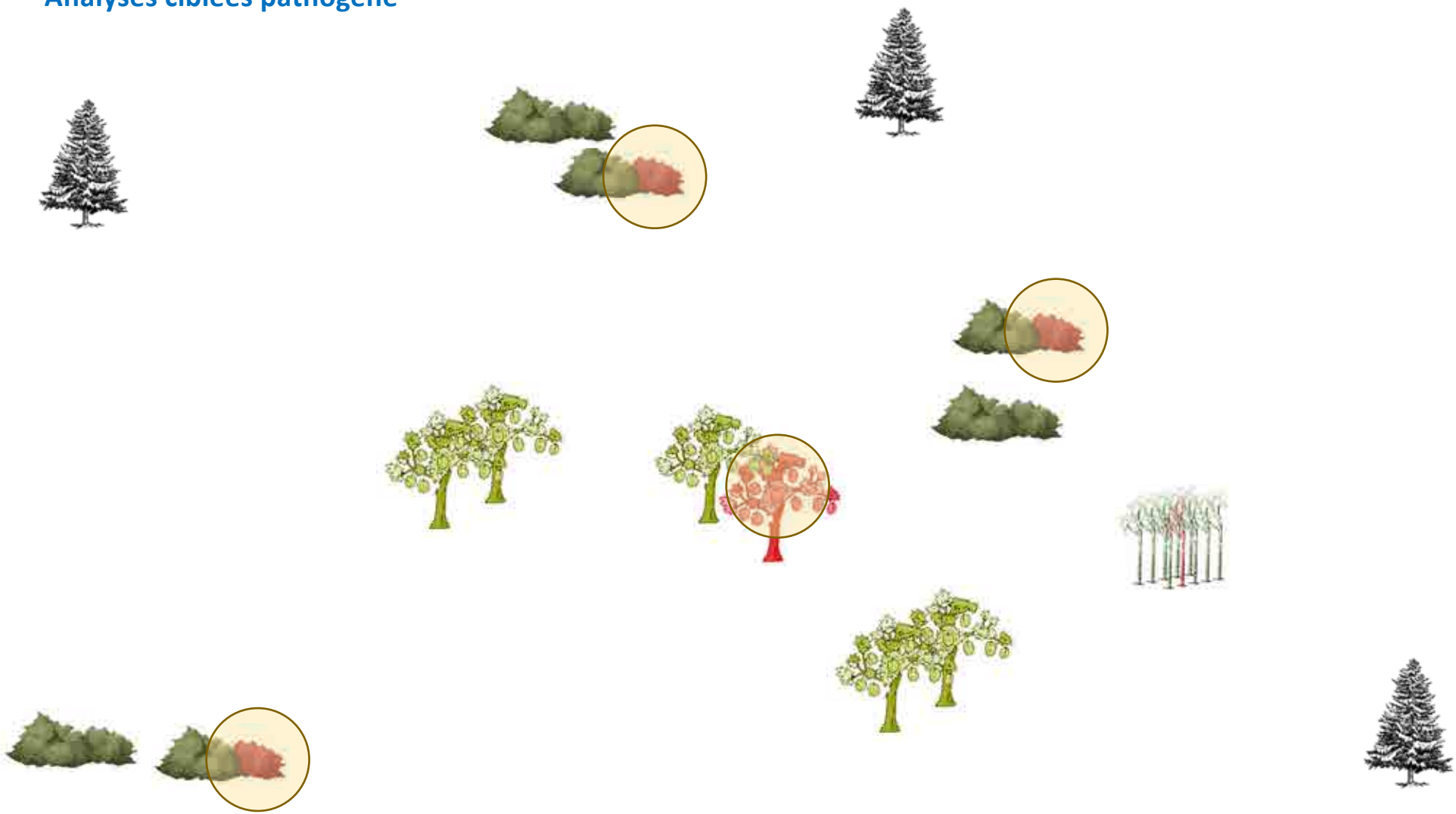
Structuration des populations

Marqueurs hyper-variables

Différentes échelles spatiales (temporelles)

Comment « Débusquer la bête » ?

Analyses ciblées pathogène



Comment « Débusquer la bête » ?

Analyse croisée génétique x géostatistique

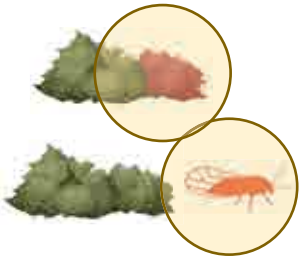
Echantillons géoréférencés

Variabilité génétique du pathogène

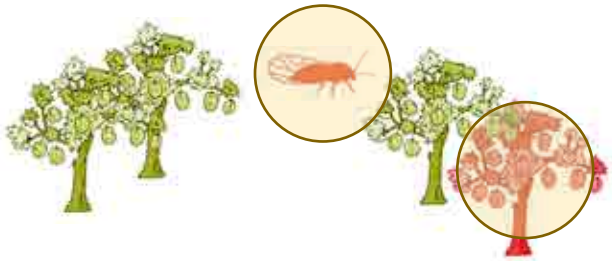
Echantillonnages massifs

3 compartiments écologiques

- *Prunus* cultivés
- *Prunus* sauvages
- Psylles



3 bassins de production



2020

SCIENTIFIC REPORTS
nature research

OPEN

Multi-scale spatial genetic structure of the vector-borne pathogen '*Candidatus* Phytoplasma prunorum' in orchards and in wild habitats

Véronique Marie-Jeanne[1,2], François Bonnot[1], Gaël Thébaud[1], Jean Peccoud[1,2], Gérard Labonne[1] & Nicolas Sauvion[1,2*]

2021

Fig. 1 : Six scenarii épidémiologiques non exclusifs illustrant les voies possibles de dissémination du phytoplasme responsable de l'ECA entre les vergers et l'habitat sauvage

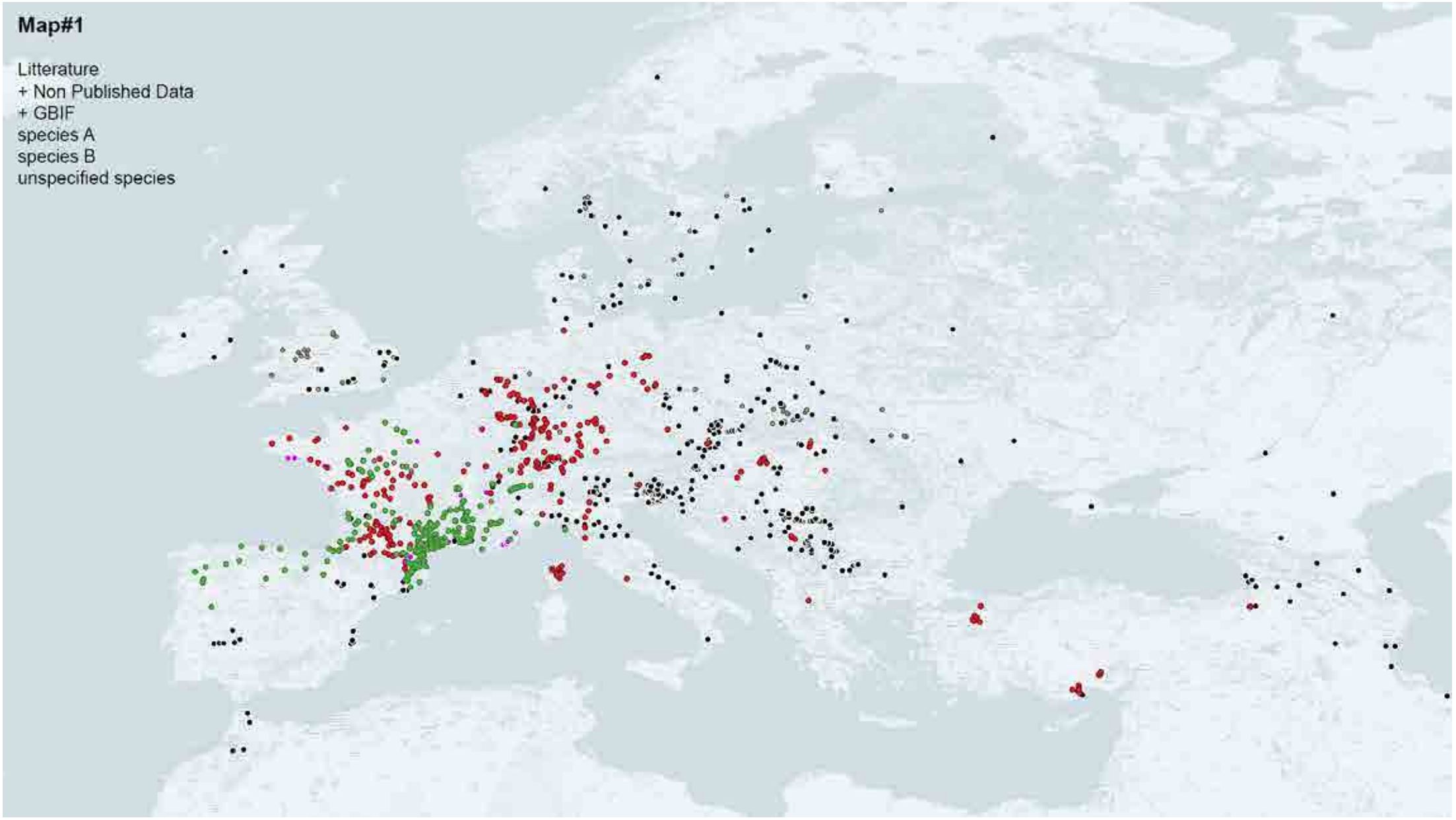
En juin, au moment de l'émergence de la nouvelle génération : contamination d'un *Prunus* cultivé par un psylle porteur (en rouge) provenant d'un arbre voisin malade (scénario S1) ou d'un massif de *Prunus* sauvages voisins hébergeant le pathogène (S2). De janvier à avril, au moment des vols retours des immigrants (psylles matures) : contamination par un psylle ayant acquis le phytoplasme sur un arbre cultivé (S3) ou un massif sauvage (S4) l'année précédente ; contaminations multiples d'arbres d'un même verger par le même psylle (S5), ou contamination d'un massif puis d'un ou des arbres cultivés d'un verger proche (S6). Des travaux de recherche récemment publiés[20] soutiennent comme le plus probable le scénario épidémiologique S4 (flèches rouges) avec des vols entre sites (vergers ou massifs de *Prunus* sauvages) distants de moins de 50 km (Nicolas Sauvion, Inrae).

Enroulement chlorotique de l'abricotier : situation en France

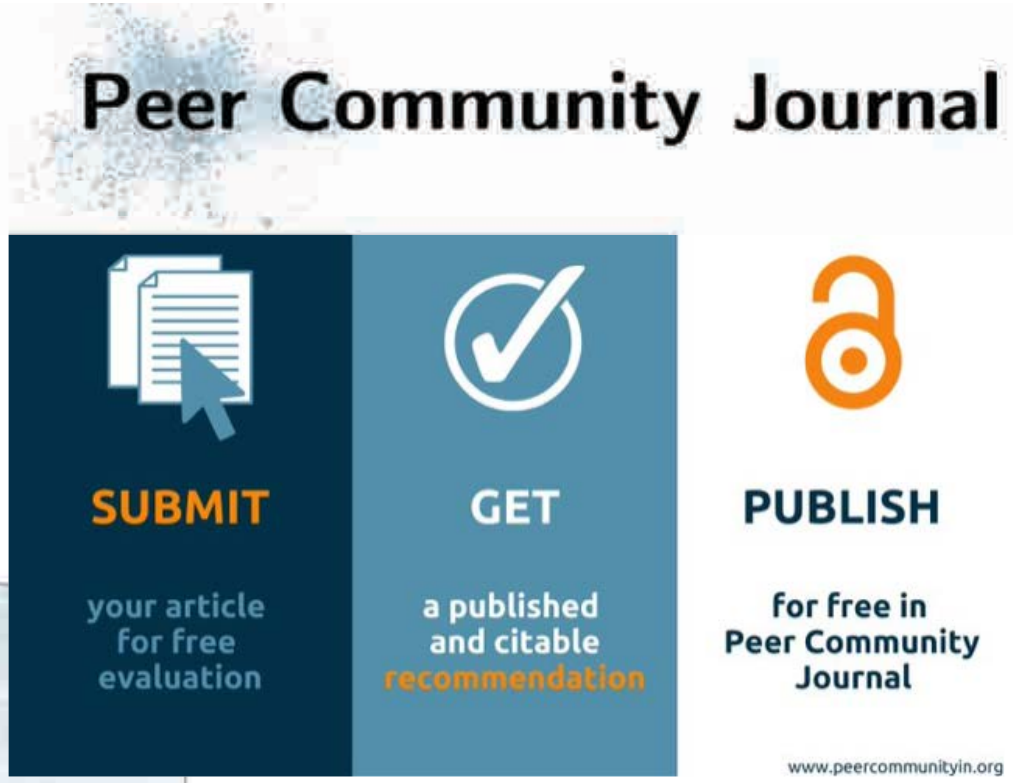
L'ECA demeure une maladie préoccupante pour les vergers d'abricotiers et de pruniers en France.

NICOLAS SAUVION*, BAPTISTE LABEYRIE** ET LAURENT BRUN***

Text Mining ??

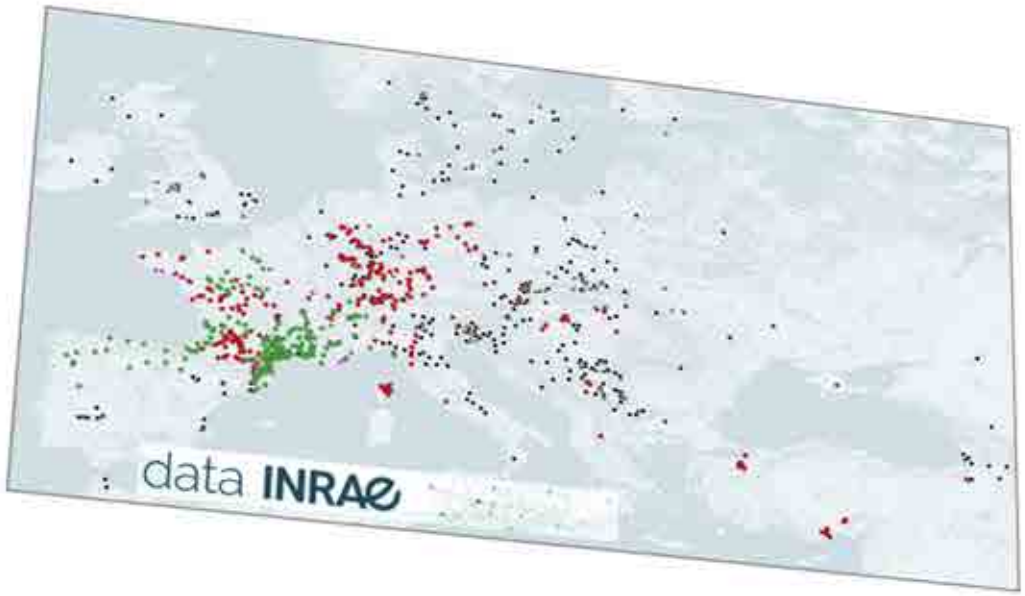

Map#1
Litterature
+ Non Published Data
+ GBIF
species A
species B
unspecified species

https://doi.org/10.15454/VC9UR5

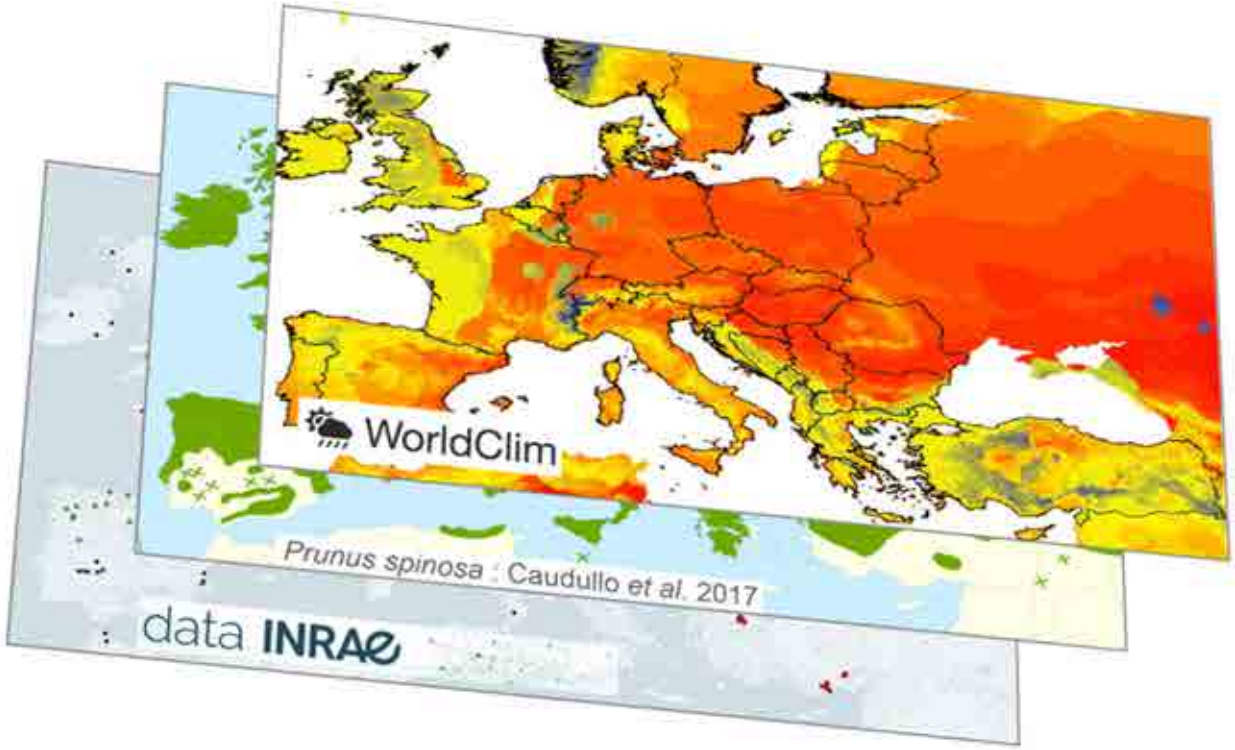


1975 occurrences psylles
Sauvion *et al.* 2021

Species Distribution Modelling (SDM)

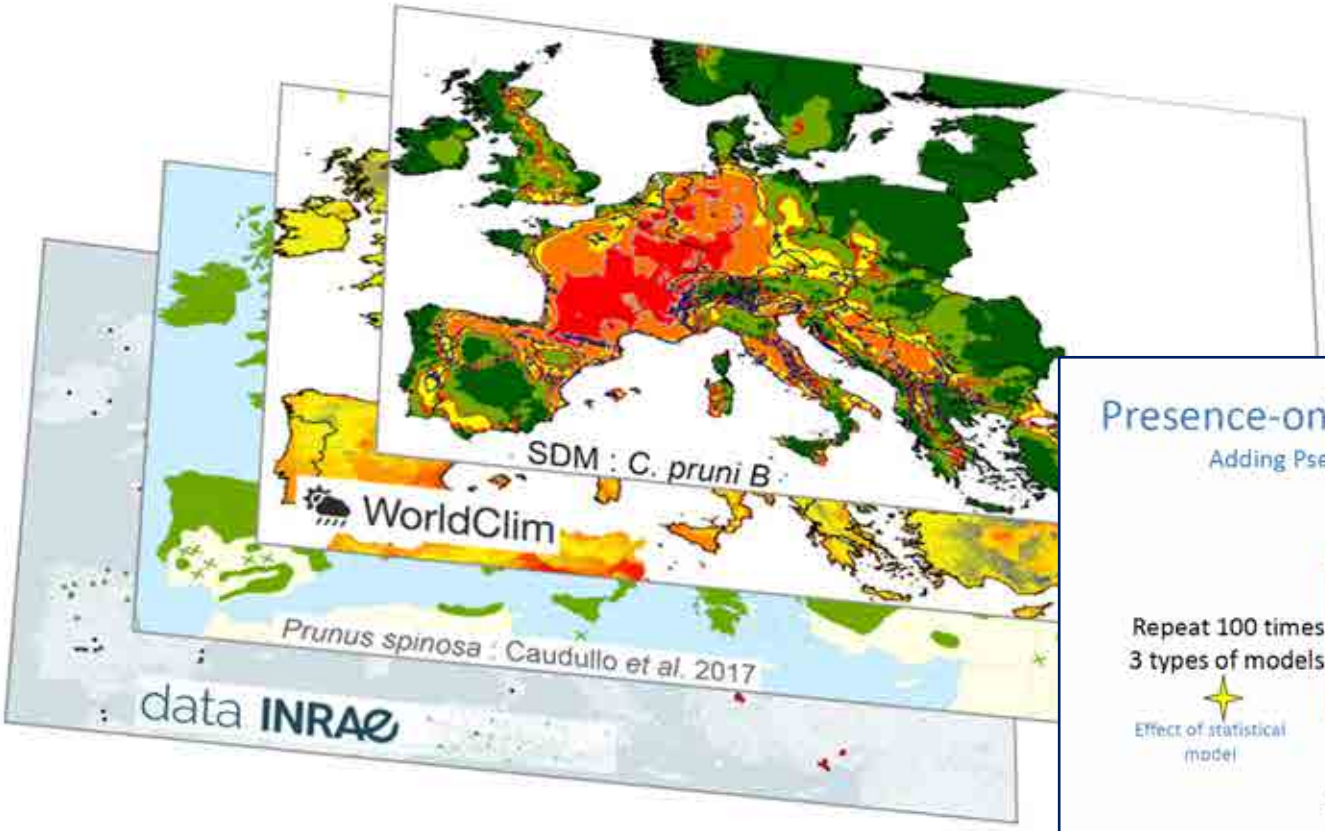


Distribution plante-hôte, plante refuge (conifères)

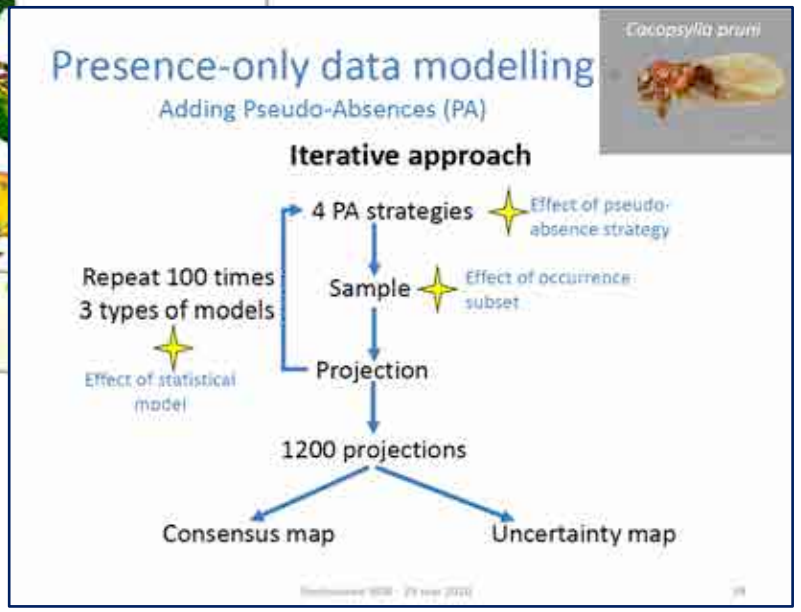


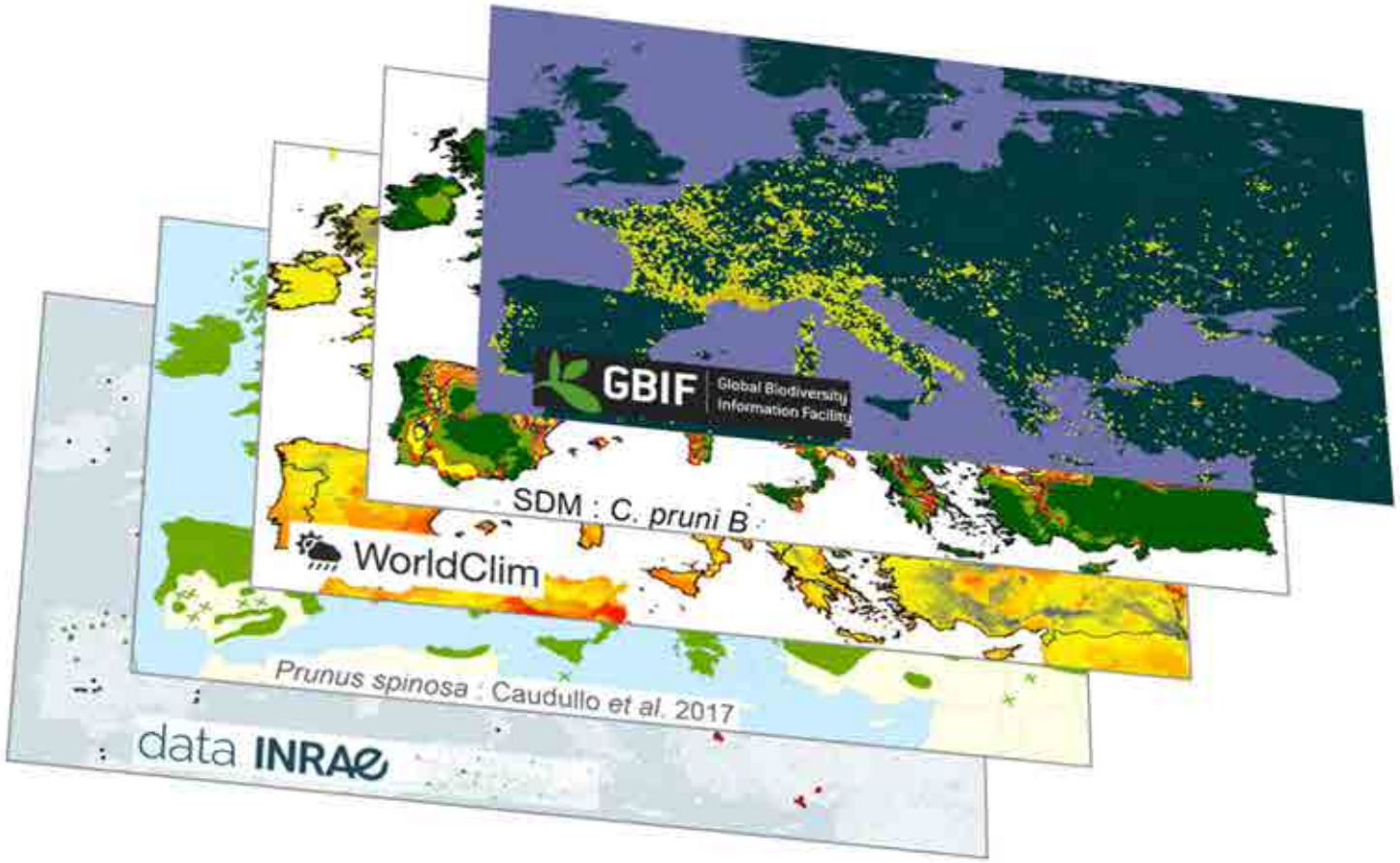
Variables climatiques

Ex. BIO8 = temp. moy trimestre le plus humide
Résolution : 10 km^2
Echelle : globe



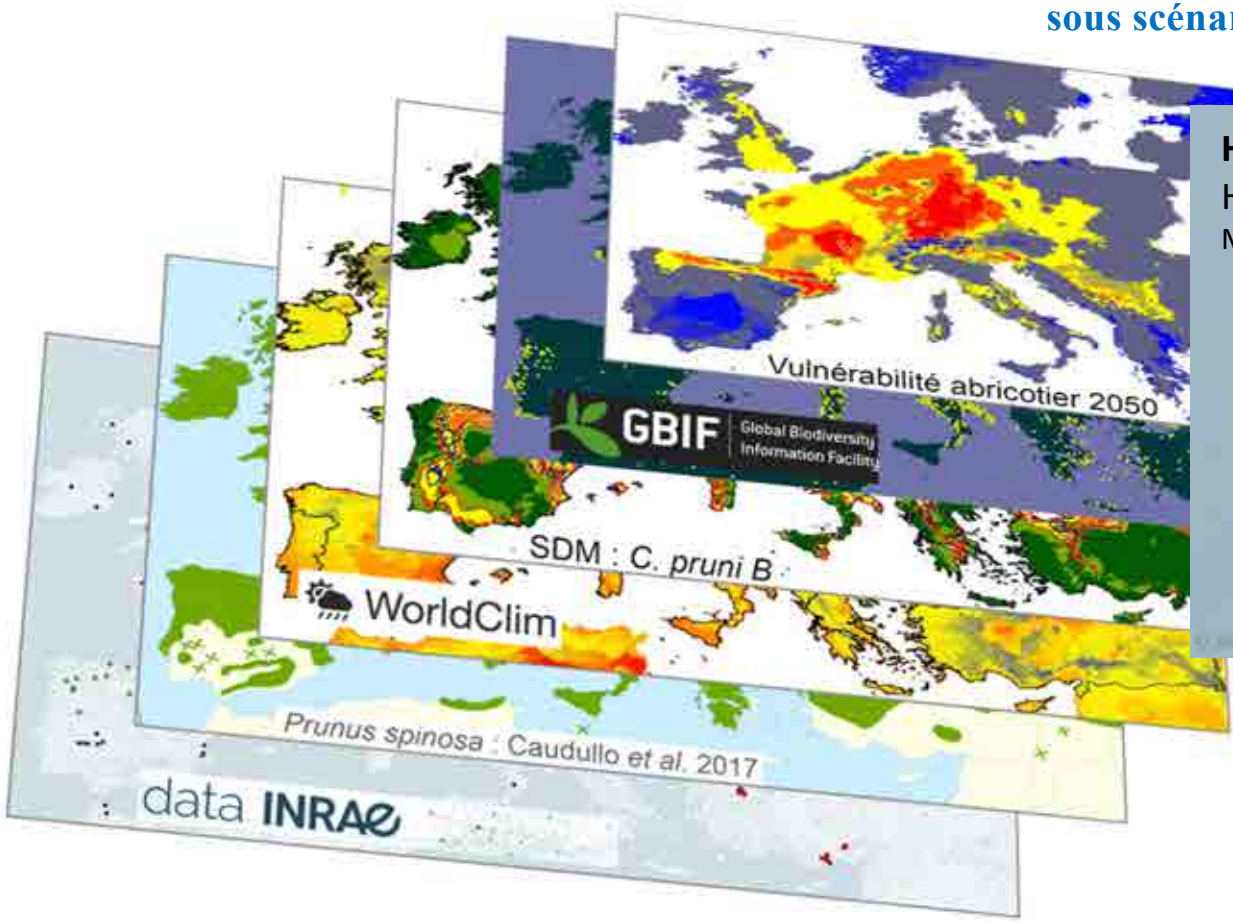
Carte modélisée de l'aire de répartition





Occurrences plantes-hôte

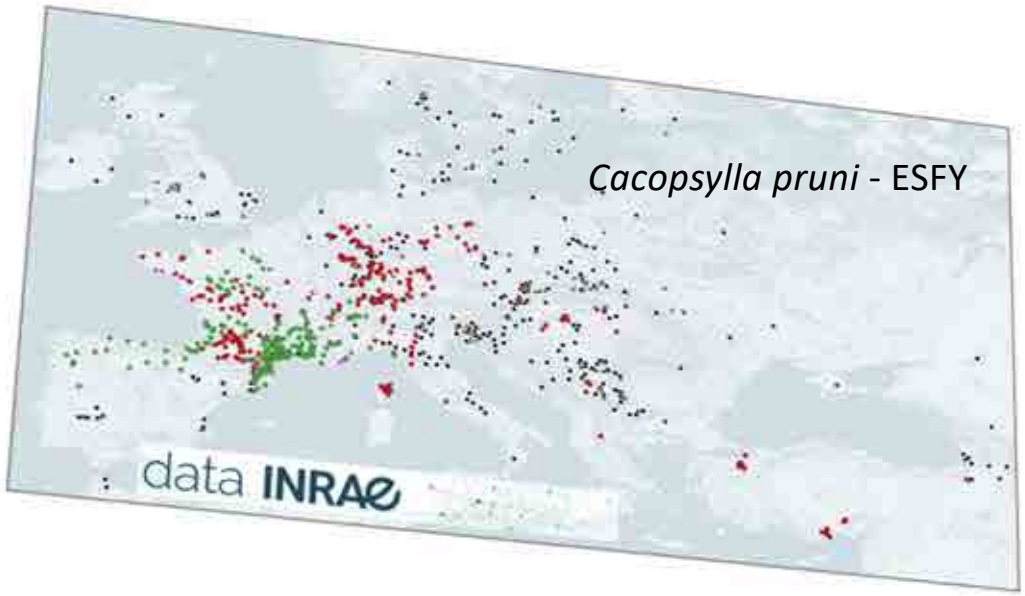
Carte prédiction vulnérabilité
sous scénarios de changement climatique



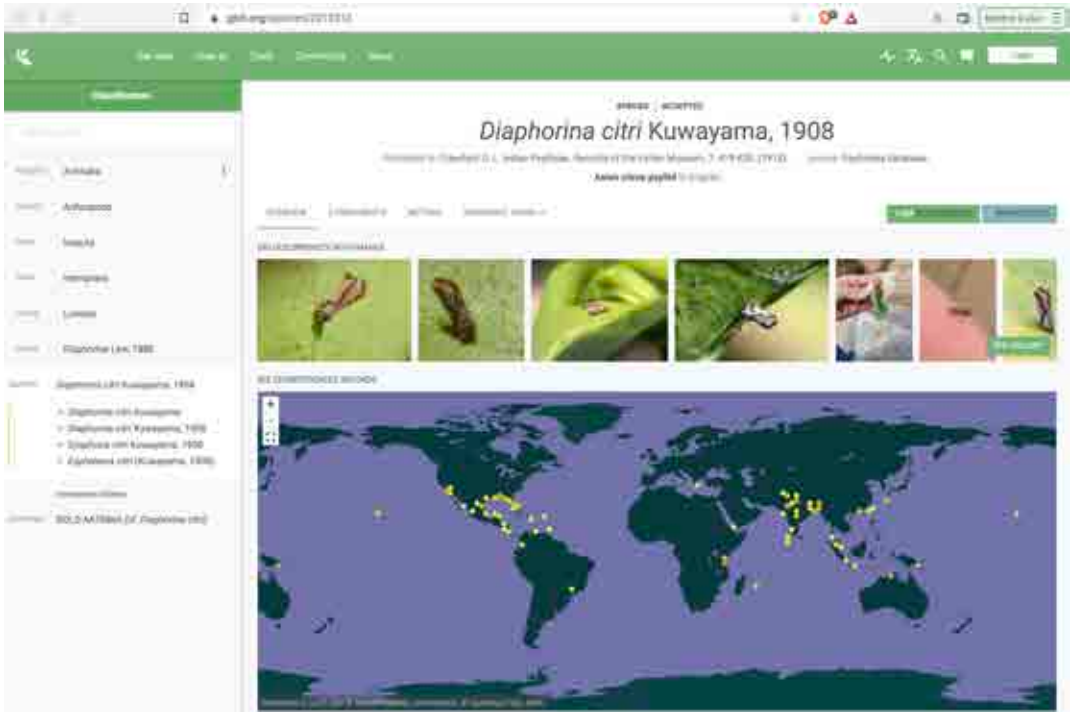
Post-doc 2023-2024

Christine Meynard

Virginie Ravigné


Cacopsylla pruni - ESFY
data INRAE

GBIF Global Biodiversity Information Facility



ISTEX

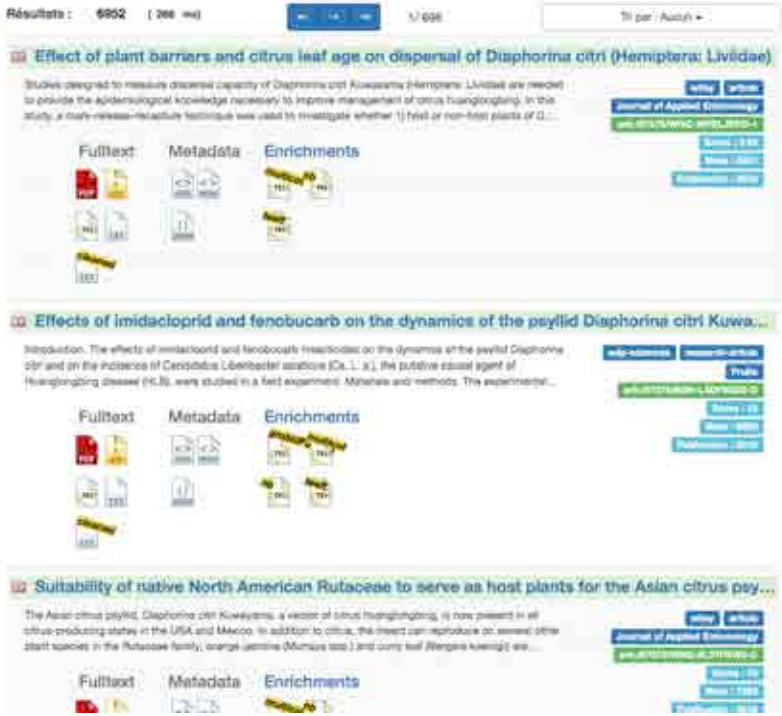
Le plus vaste réservoir d'archives scientifiques au service de la recherche française

25,6 M de documents

9 318 revues

349 134 ebooks

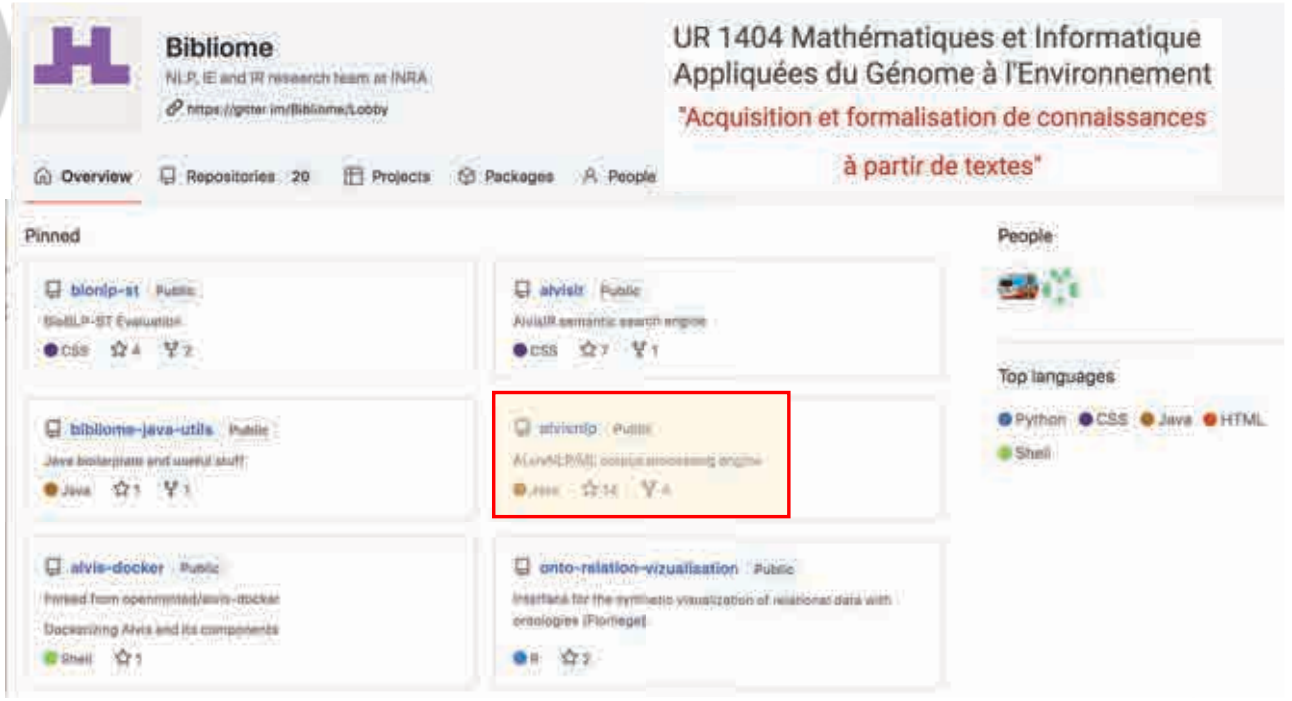
publiés de 1473 à 2020



Elisa Lubrini

Claire Nédellec

MaIAGE INRAE université PARIS-SACLAY



Objectif : Extraction automatique et modélisation de connaissances à partir de données textuelles pour obtenir des occurrences datées et géolocalisées.

TEXT-MINING !!!

Beyond

Building epidemiological surveillance and plant disease prevention with observations both near & distant

L'Escadre françoise entrant dans Newport sous le feu des Batteries en forçant le passage le 8e Aoust 1778. Jour que les Américains passerent sur l'Isle de Rode Island par le chemin d'bowland's Ferry.

A La Ville de Newport.
B Batteries sur Rode Island faisant feu sur les Vaisseaux.
C Batteries sur Goat Island faisant feu sur les Vaisseaux.
D Isle de Conanicut.
E Vaisseaux françois forçant le passage.
F Vaisseaux François tournant ou qui ont tourné l'Isle de Conanicut.
G Batiments Anglois en feu.
H Batterie qui fut abandonnée après avoir tiré sur le premier Vaisseau françois qui tourna Conanicut.
I Frégate françoise restant mouillée au dehors avec une prise tandis que les deux autre frégates sont dans le Canal de l'Est ou elles amenent le passage d'bowland's Ferry après avoir fait bruler les deux Batiments Gardes côtes Anglois qui deffendoient ce Canal.

N.B. Les Anglois brulerent ou coulerent a Rode Island, les Frégates l'Orphée, la Junon, le Lark et la Flore de 32 Canons le Cerbere et le Faucon de 28. sans parler d'un grand nombre de Batiments Marchands.

WIKIMEDIA COMMONS

File:Escadre de d'Estaing entrant dans baie de Newport le 8 aout 1778.jpg

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Original file (6,409 × 3,079 pixels, file size: 7.23 MB, MIME type: image/jpeg) Zoom/Viewer

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Information about reusing

File information | Structured data

Captions Edit

English — Add a one-line explanation of what this file represents

Summary

Description	**Français** : Dessin de Pierre Ozanne, artiste ayant embarqué avec la première escadre française intervenant en Amérique en 1778. **English:** French attack on Newport, 1778
Date	1778
Source	Librairie du Congrès (https://www.loc.gov/item/2010589350/)
Author	**Pierre Ozanne (1737–1813)**

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	Date/Time	Thumbnail	Dimensions	User	Comment
current	20:01, 23 January 2016		6,409 × 3,079 (7.23 MB)	AYE N (talk | contribs)	User created page with UploadWizard

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Camera model	Digiscan AO 14000 PDB
Date and time of data generation	10:33, 1 November 2010

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This page was last edited on 26 October 2020, at 13:47.

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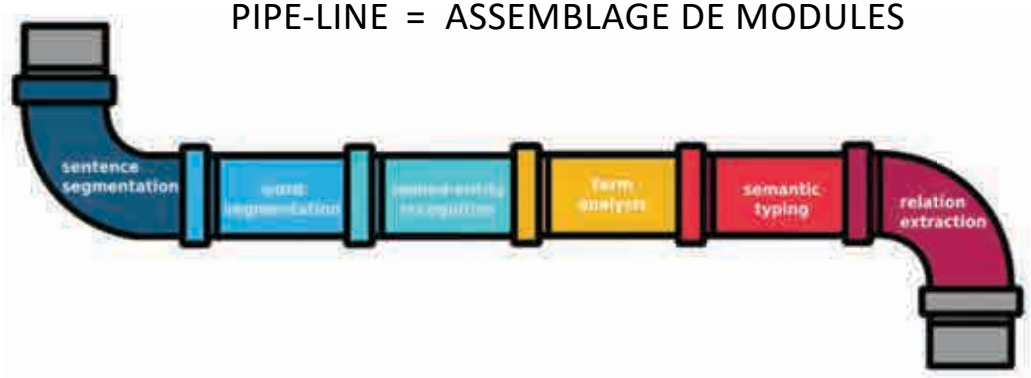
Natural Language Processing

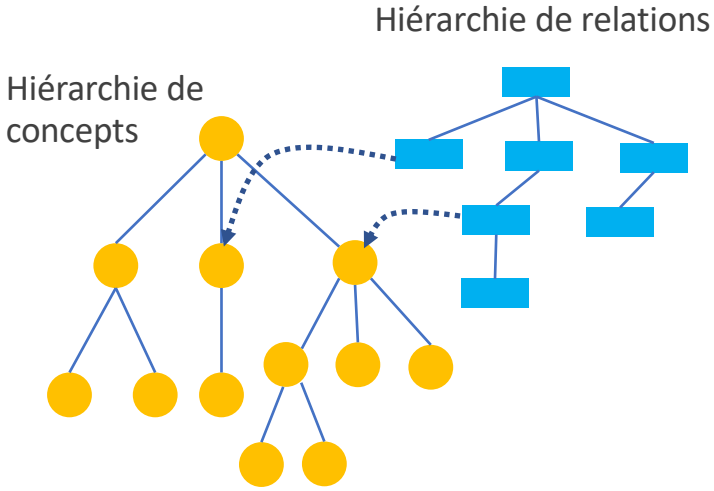
Sous-domaine de la **linguistique**, de l'**informatique** et de l'**intelligence artificielle**

⇒ traiter et analyser de **grandes quantités** de données en langage naturel.

⇒ « comprendre » le contenu de documents, y compris les **nuances contextuelles** de la langue qu'ils contiennent

PIPE-LINE = ASSEMBLAGE DE MODULES

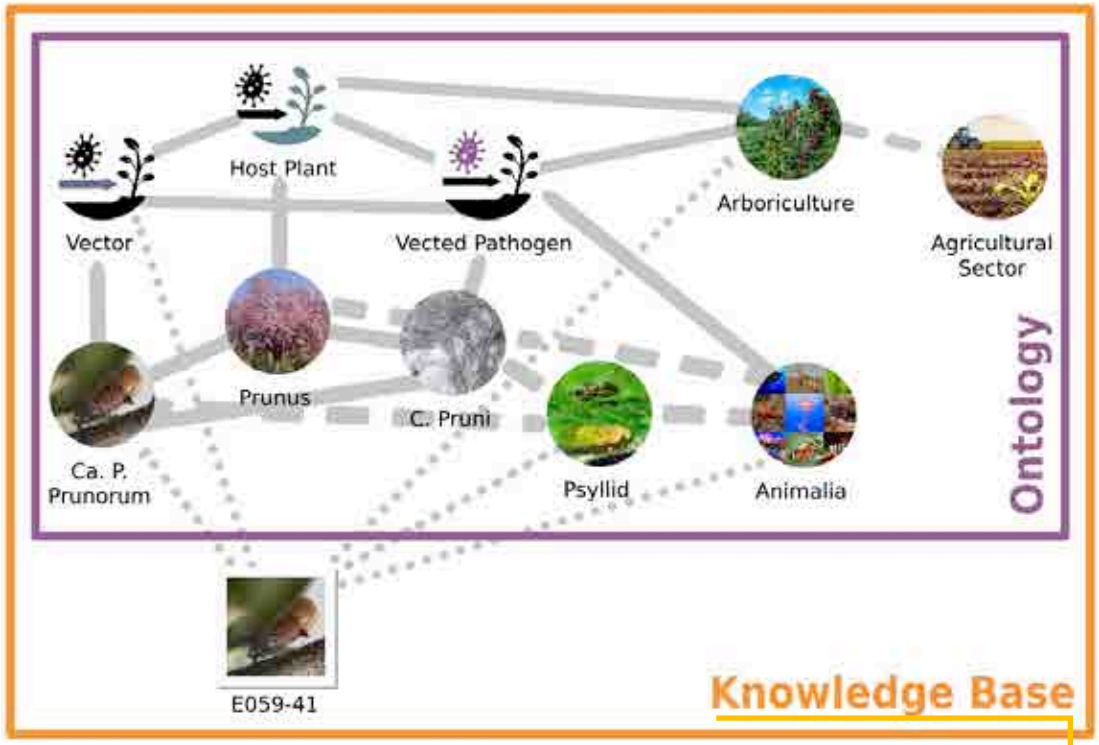




Ontologie

Spécification explicite et partagée d'une conceptualisation, c'est-à-dire qui permet de spécifier dans un langage formel les concepts d'un domaine et leurs relations.

l'« ontologie est aux données ce que la grammaire est au langage »



Elisa Lubrini – Réunion Plénière BEYOND Mai 2022

Intérêts fondamentaux
- Extraire mieux en mieux entités
- Articulations science vs. observations

Intérêts personnels stratégiques

expert NLP

Enrichissement mutuel !!

biologiste

Use cases

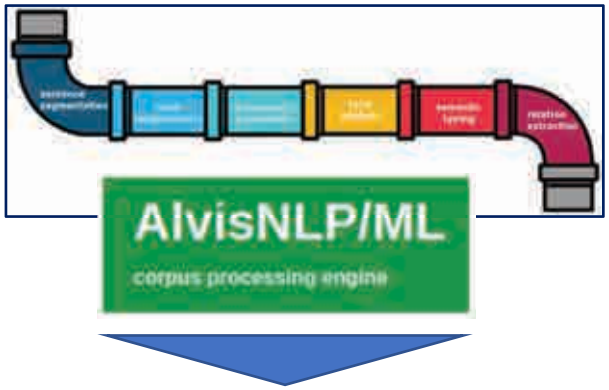
Intérêts personnels stratégiques

Synonymes

Chermes pruni
Psylla pruni
Psylla fumipennis
Cacopsylla pruni
Cacopsylla (Thamnopsylla) pruni


European Journal of Plant Pathology 107: 695–700, 2001.
© 2001 Kluwer Academic Publishers. Printed in the Netherlands.
Transmission characteristics of the European stone fruit yellows phytoplasma and its vector Cacopsylla pruni
Luigi Carraro, Nazia Loi and Paolo Ermacora
Dipartimento di Biologia applicata alla Difesa delle Piante, Università di Udine, via Scienze 208, 33100 Udine, Italy (Fax: +390432558501; E-mail: carraro@dipbiapl.uniud.it)
Accepted 4 June 2001
Key words: acquisition, inoculation, latency, retention
Abstract
A study was carried out on the transmission parameters of the European stone fruit yellows phytoplasma by the vector Cacopsylla pruni. In the greenhouse, using groups of psyllids, the minimum acquisition period was 2–4 days, the minimum latent period 2–3 weeks and the minimum inoculation period 1–2 days. The vectors retained infectivity until their death. Under natural conditions retention of infectivity in C. pruni lasts through the winter and the following spring, when the overwintering insects reach the stone fruit trees, they are already infected and infective. The research shows that the vector C. pruni transmits the European stone fruit yellows phytoplasma in a persistent manner.
Abbreviations: AAP – acquisition access period; ESFY – European stone fruit yellows; IAP – inoculation access period; LP – latent period; PCR – polymerase chain reaction; RFLP – restriction fragment length polymorphism.
Introduction
The most common vectors of phytoplasmas are leafhoppers (Hemiptera: Cicadellidae) (Chiykowski, 1981; Sinha, 1984; Tsai, 1979), but the transmission characteristics of only a few of them are known, i.e. aster yellows (Chiykowski and Sinha, 1969), X disease (Purcell, 1979), clover phyllody (Cousin et al., 1968), beet leafhopper transmitted virescence agent (Goheen et al., 1987) and maize bushy stunt (Legrand and Power, 1994). It should also be remembered that psyllids are among the vectors of phytoplasmas. Jensen et al. (1964) showed that pear psylla (Psylla pyricola Förster, now Cacopsylla pyricola Förster) transmitted 'a virus' capable of causing pear decline. More recently transmissions of pear decline-phytoplasma have been obtained in France (Lemoine, 1991) and in Italy (Carraro et al., 1998a) by Cacopsylla pyri L. Other Cacopsylla spp. have been identified as phytoplasma vectors. Carraro et al. (1998c) ascertained that Cacopsylla pruni Scopoli is the vector of ESFY-phytoplasma. Alma et al. (2000) and Frisinghelli et al. (2000) identified respectively Cacopsylla melanoneura (Förster, 1848) and Cacopsylla costalis (Flor, 1861) as vectors of the apple proliferation-phytoplasma. Pear decline, ESFY and apple proliferation agents are genetically related, all belonging to the phytogenetic group 'apple proliferation' (Seemüller et al., 1998); therefore there is a high correlation between this group of typically epidemic fruit tree diseases and related psyllids. Up to now there has been no precise information regarding the transmission parameters of phytoplasmas by psyllids. A knowledge of the chronological phases of the transmission process, i.e., acquisition, latency, inoculation and retention of infectivity in the vector (Purcell, 1982), is of fundamental importance for epidemiological studies and research aimed at preventing such diseases.
In this paper we report the results of a study aimed at determining the transmission characteristics of ESFY-phytoplasma by using the vector C. pruni. To understand the paper better it must be remembered
IMAGE


foreign character
Article Title
Title
header
columns
pytesseract
PyPDF4
pdfminer.six
PyPDF4
TIKA


AlvisNLP/ML
corpus processing engine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rank species
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species-name
not-ambiguous yes
psyllid hemiptera
seq__fix yes
wordtype fixed
pos not-pos
lemma Cacopsylla pruni
tt_pos NP
chunk I-NP
genia-entity 0
lemma2 cacopsylla pruni
variant Cacopsylla pruni
selected true
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concept-name living organism
concept-path /OBT:000001/OBT:000010
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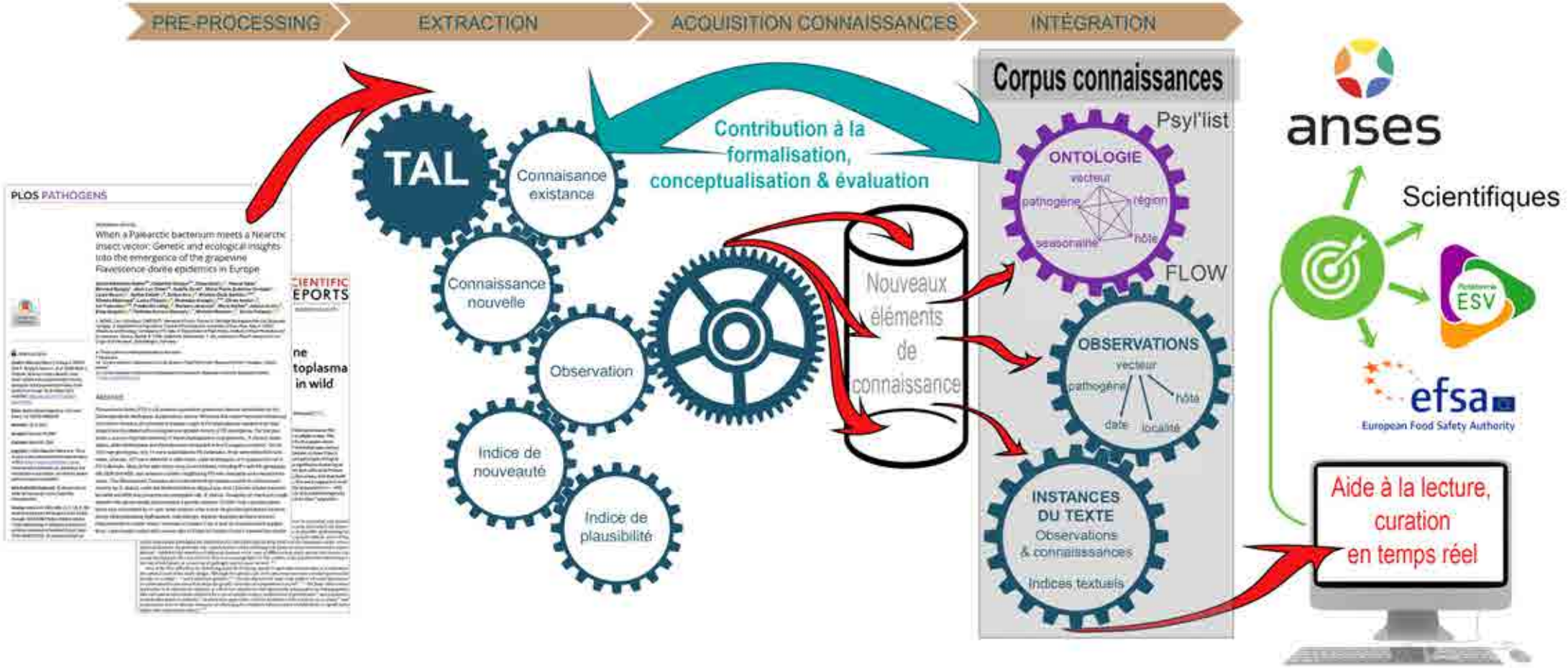
form Cacopsylla pruni

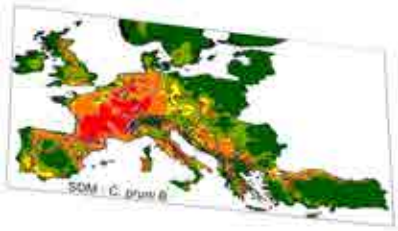

PRE-PROCESSING
EXTRACTION
ACQUISITION CONNAISSANCES
INTÉGRATION
PLOS PATHOGENS
When a Palearctic bacterium meets a Nearctic insect vector: Genetic and ecological insights into the emergence of the grapevine Flavescence dorée epidemics in Europe
TAL
Connaissance existance
Connaissance nouvelle
Observation
Indice de nouveauté
Indice de plausibilité
Contribution à la formalisation, conceptualisation & évaluation
Nouveaux éléments de connaissance
Corpus connaissances
Psyl'list
ONTOLOGIE
vecteur
pathogène
région
saisonnalité
hôte
FLOW
OBSERVATIONS
vecteur
pathogène
hôte
date
localité
INSTANCES DU TEXTE
Observations & connaissances
Indices textuels
anses
Scientifiques
ESV
efsa
European Food Safety Authority
Aide à la lecture, curation en temps réel

Biodiversity Data Journal 9: e68860
doi: 10.3897/BDJ.9.e68860

Data Paper

Occurrence data for the two cryptic species of *Cacopsylla pruni* (Hemiptera: Psylloidea)

Preuve de concept



C. pruni
Prunus
CaPP

Psylles
Rosacées
Phytoplasmes

Psylles
Liberibacters
Rutacées
Solanacées

Hemiptères
Bactéries, Virus…

VECTEURS
Arthropodes

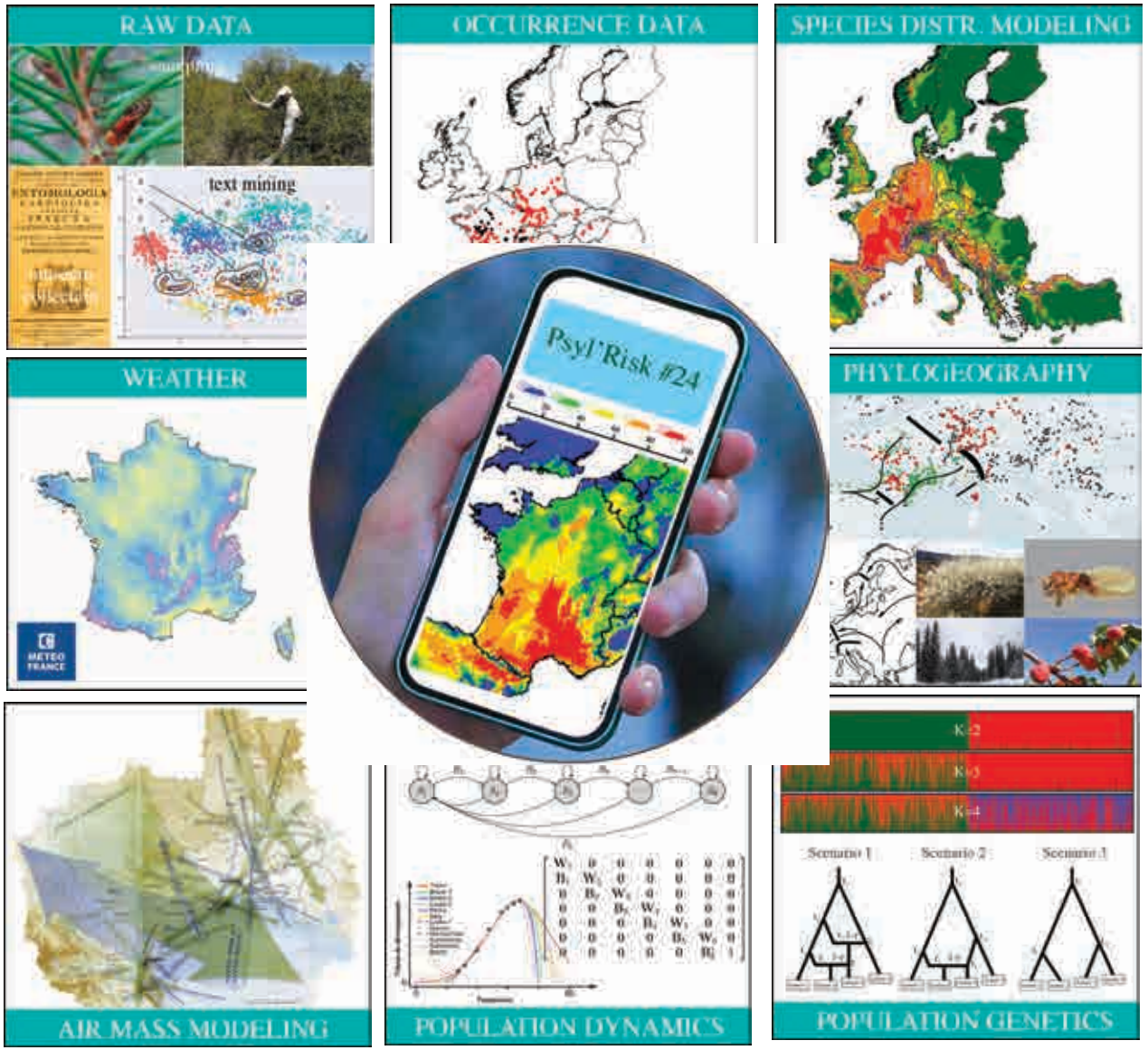
AphidNet
A resource for aphid systematics and taxonomy

APHIDS ON THE WORLD'S PLANTS
An online identification and information guide

FLOW

SORBONNE UNIVERSITÉ

Fulgoromorpha Lists On the Web
A knowledge and a taxonomy database dedicated to planthoppers (Insecta, Hemiptera, Fulgoromorpha, Fulgoroidea)


RAW DATA
text mining
OCCURRENCE DATA
SPECIES DISTR. MODELING
Psyl'Risk #24
WEATHER
METEO FRANCE
PHYLOGEOGRAPHY
AIR MASS MODELING
POPULATION DYNAMICS
K=2
K=3
K=4
Scenario 1
Scenario 2
Scenario 3
POPULATION GENETICS

FRANCE22

PRÉSIDENCE FRANÇAISE DU CONSEIL DE L'UNION EUROPÉENNE

GROWING PROTECTING *differently*

BEYOND

Building epidemiosurveillance & prophylaxis with observations near & distant

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CONTEXT & AIMS

- Epidemiological surveillance is essential for anticipating health crises in agriculture and applying efficient prophylaxis.
- Current monitoring strategies have a limited scope in space and time and often underestimate the close link between biodiversity and pests.
- BEYOND focuses on enhancing epidemiological surveillance strategies by developing new indicators of risk of plant disease that account for broader scales of space, time and biodiversity and more extensive interconnectivity of ecosystems and geographic regions

CHALLENGES

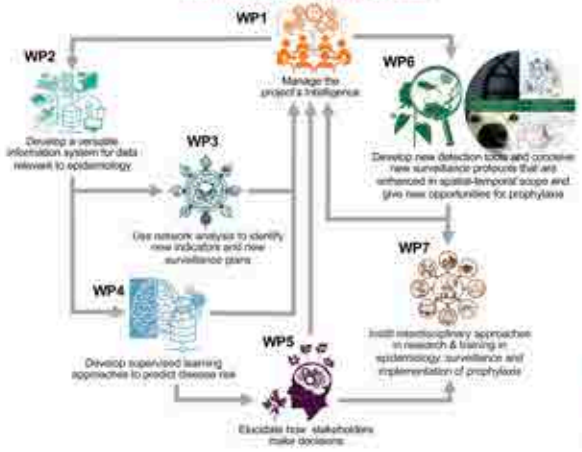
- Uncover unsuspected reservoirs and update life histories of pathogens.
- Elucidate drivers of virulence diversification.
- Account for the natural highways of long distance dissemination.
- Update disease forecasts in the face of changing land use, cultivation practices and climate.

ORGANISATION & METHODOLOGIES

Management Council

10 French teams

7 WPs to facilitate the interdisciplinary approaches needed to achieve project goals



15 pathosystems involving

PERSPECTIVES

Build knowledge and data bridges to facilitate surveillance compatible with One Health

✓ **We strive to clarify knowledge representation and contribute to the accessibility of massive and heterogeneous data for epidemiology**
- Data integration by ontology
- Data and service catalogs on web portals
- Data and knowledge search and visualization

✓ **... from diverse data sources**
- Scientific documents, news
- Earth and satellite images
- Climate and meteorological data
- Transport data
- Pest and practices
- Land use and landscape

✓ **We are building multi-actor approaches**
- Teaching and capacity building
- Co-modelling

✓ **We will contribute to knowledge inference, data science, modelling and pattern recognition**
- Ontology-based information extraction
- Intelligent system design
- Machine learning
- Mechanistic modelling
- Construction, inference & analysis of spatio-temporal networks
- Combining spatial statistics, population dynamics, genetics & phylogeography
- Analysis of remote sensing data
- Analysis of data from citizen science and crowdsourcing

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