DiverCILand : Diversity of Crops In Landscape, a data management tool dedicated to rust disease prevention at landscape level

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DiverCILand : Diversity of Crops In Landscape, a data management tool dedicated to rust disease prevention at landscape level

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ABISOFT team, GQE- Le Moulon

RUSTWATCH
WHEAT RUST EARLY WARNING

Le Moulon
GÉNÉTIQUE QUANTITATIVE ET ÉVOLUTION

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

OVERVIEW OF A NEW TOOL - DIVERCILAND

DiverCILand - Diversity of Crops In Landscape *"A web application with associated database"*

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Data management

- Varieties description and management of DUS (Distinctness, Uniformity and Stability) and VCUS (Value for Cultivation, Use, and Sustainability) data
- Description of crops landscape
- Genotyping rust resistance genes

Data visualization and export

- Variety data card
- Varieties life cycle and deployment
- Mapping varieties deployment at European scale
- Genotyping data tables

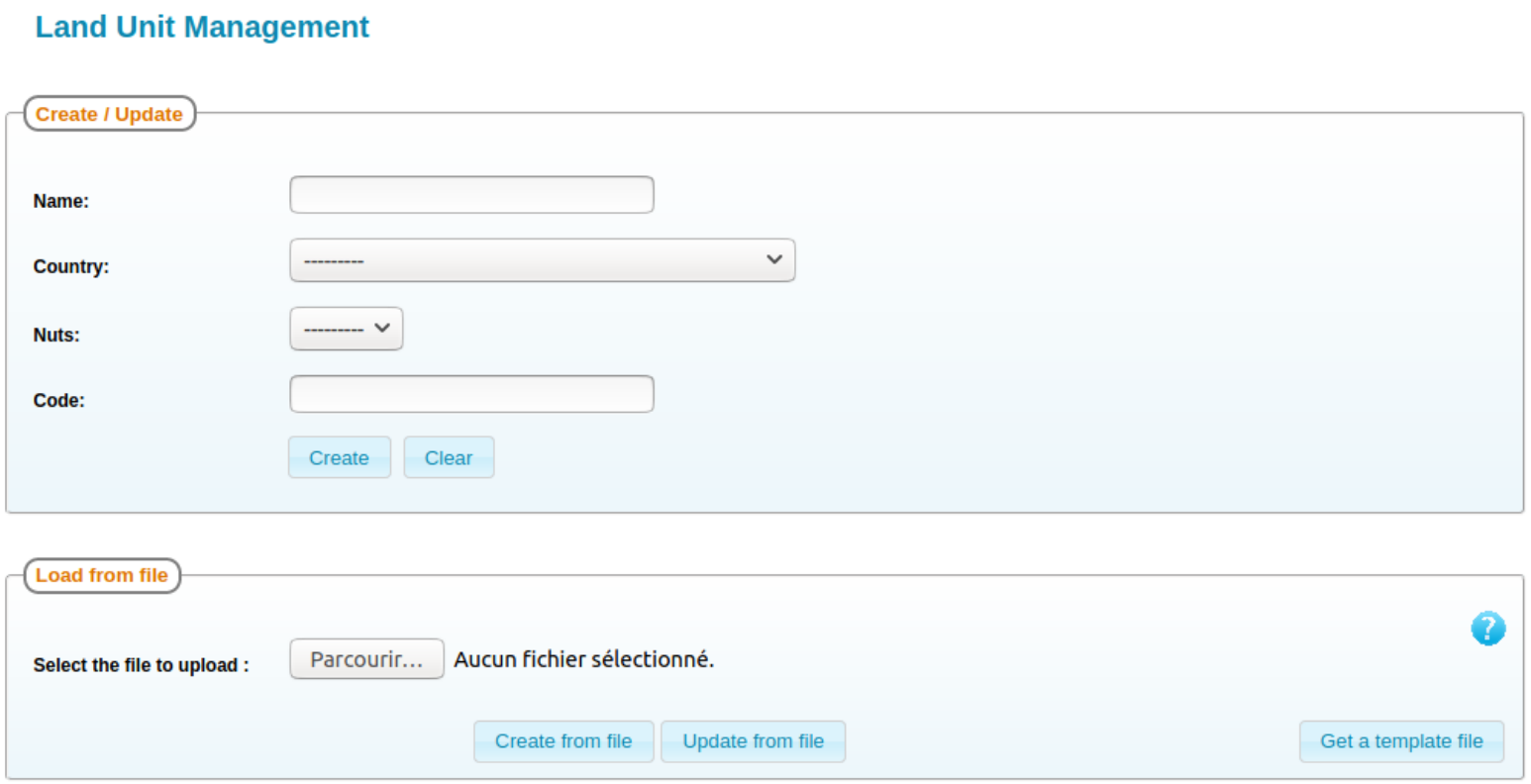
Two user status in DiverCILand:

→ Admin: can access data management and data visualization and export

→ Read only: can access data visualization and export

DIVERCILAND ADMIN INTERFACES – LOAD DATA

Two ways to submit data in DiverCILand



With a form

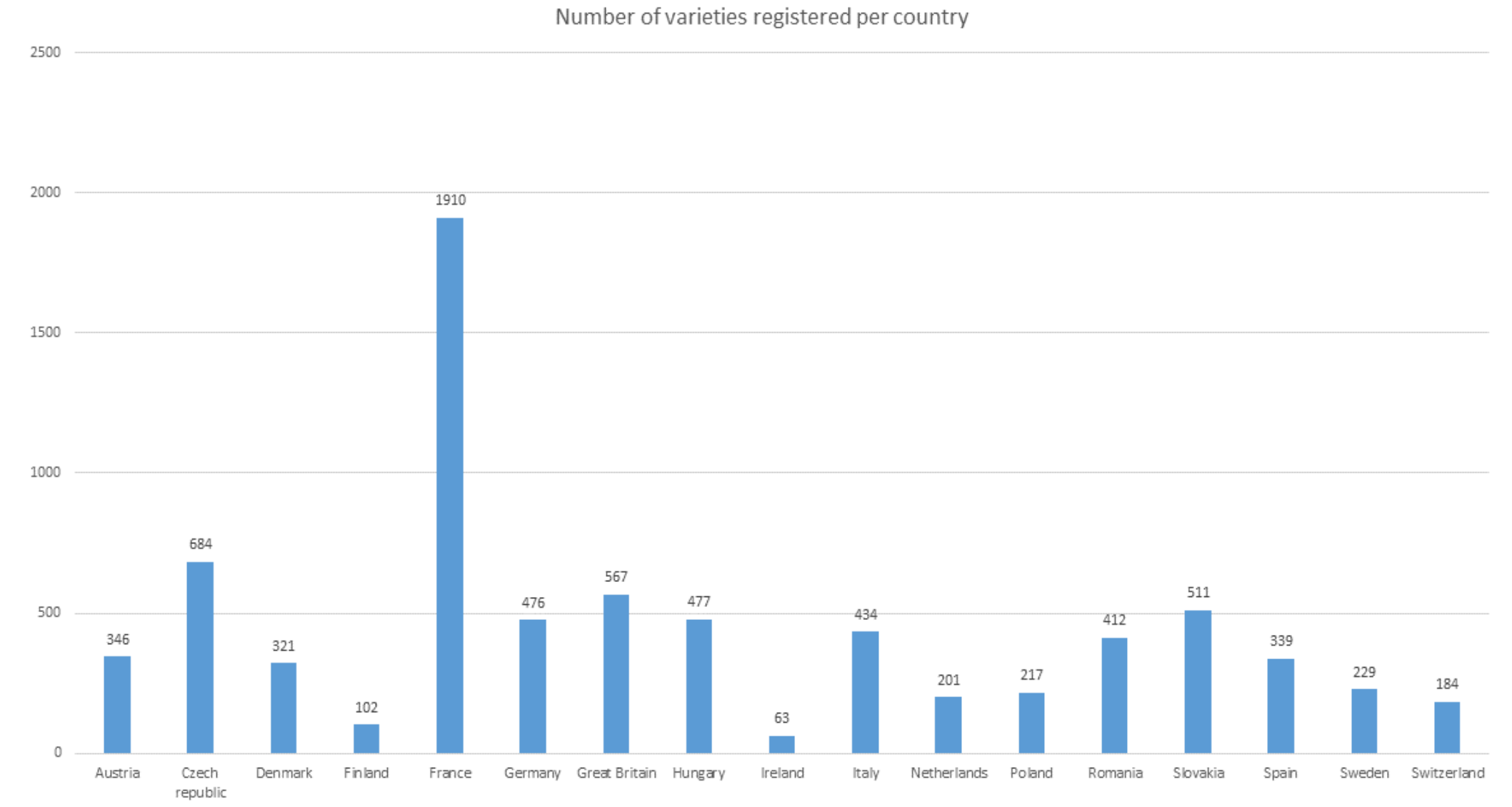
- Creates one object at a time
- Only available for some data types

With a file (CSV format)

- Creates one or several objects at a time
- Available for all data types

VARIETIES RECORDED IN THE DATABASE

Data collected by Florence Dubs, Rémi Perronne and Jérôme Enjalbert

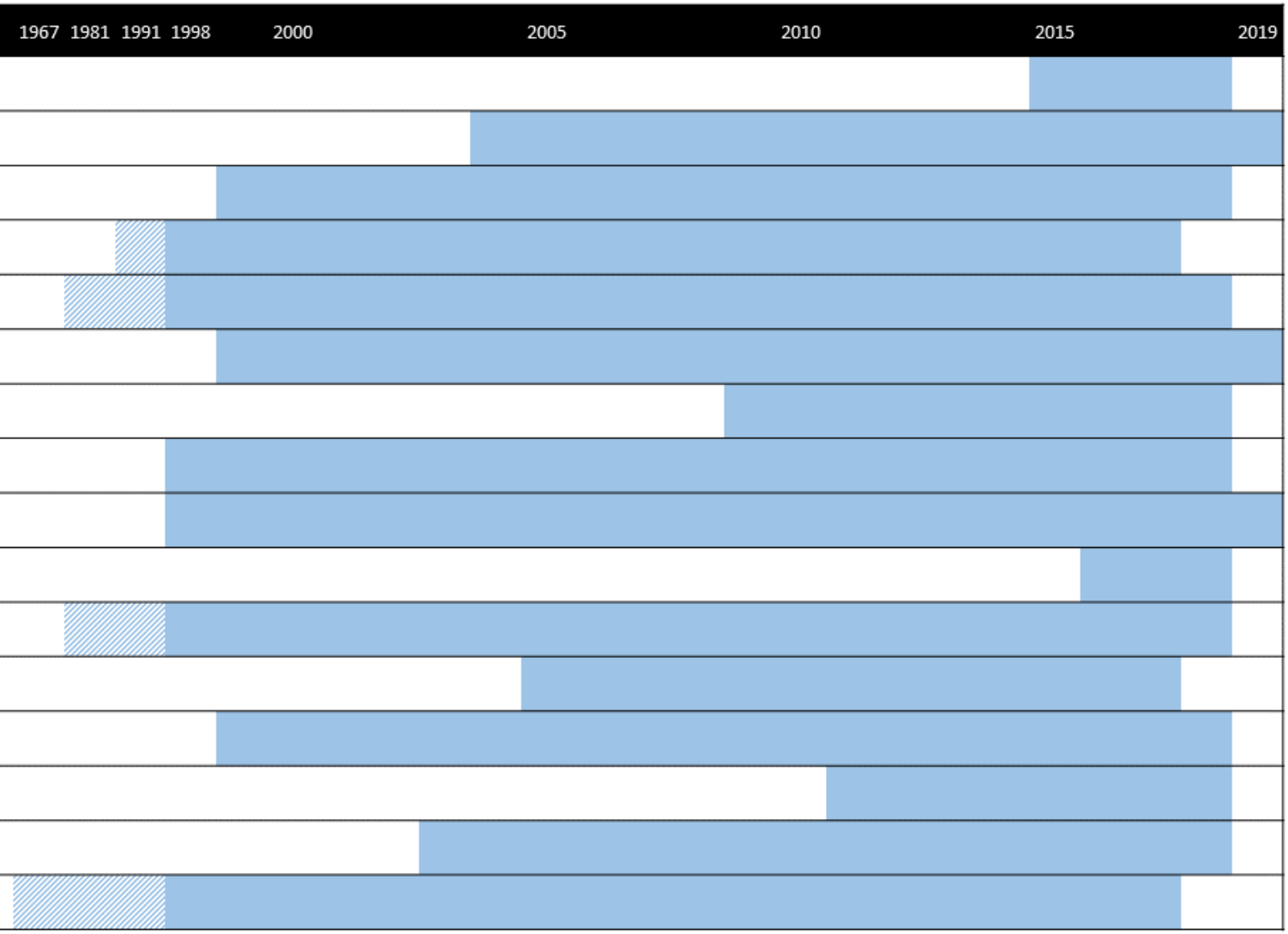


DEPLOYMENT DATA OVERVIEW

Data collected by Florence Dubs, Rémi Perronne and Jérôme Enjalbert

Uncontinuous time scale **Continuous time scale**

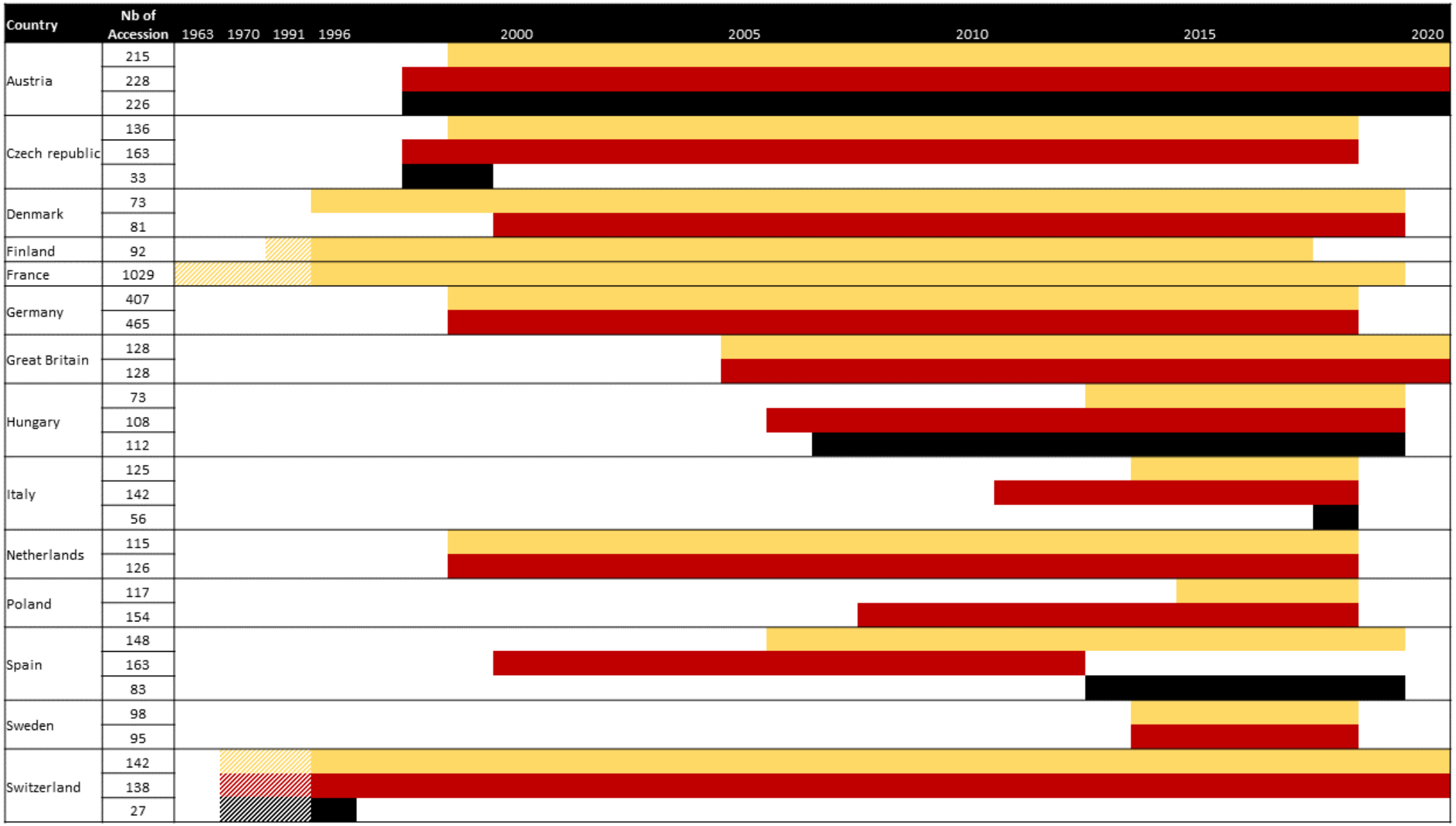
Country	How data have been computed	Local data
Austria	computed from multiplication	no
Czech republic	computed from multiplication	no
Denmark	computed from multiplication	no
Finland	calculated raw data	no
France	raw data (area)	**yes**
Germany	computed from multiplication	no
Great Britain	computed from multiplication	no
Ireland	computed from multiplication	no
Italy	computed from multiplication	no
Netherlands	computed from multiplication	no
Poland	raw data (percentage)	no
Romania	calculated raw data	no
Slovakia	computed from multiplication	no
Spain	computed from multiplication	no
Sweden	computed from multiplication	no
Switzerland	raw data (area)	no



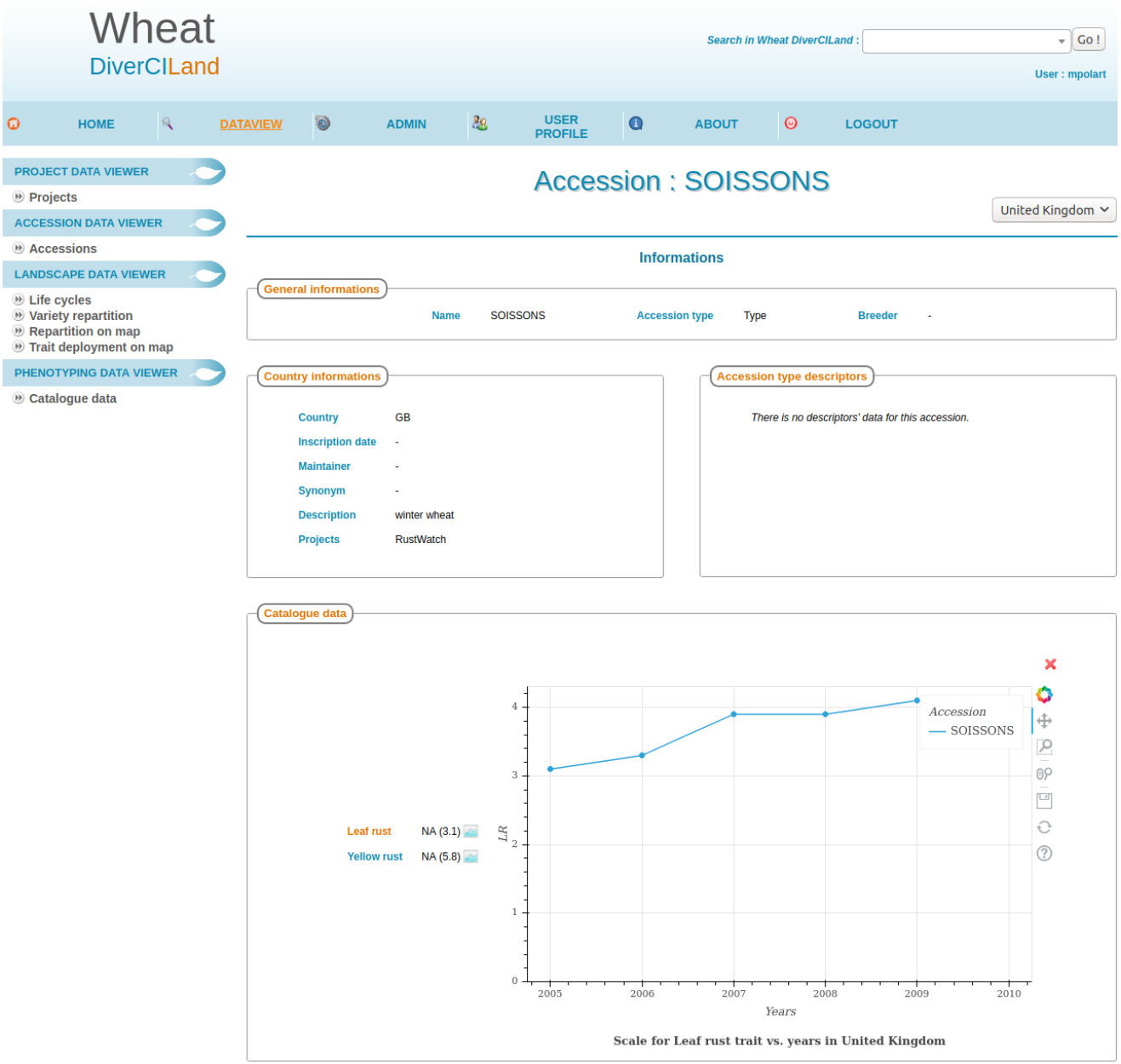
RUST RESISTANCE VCUS DATA

Data collected by Florence Dubs, Rémi Perronne and Jérôme Enjalbert

Yellow Rust **Leaf Rust** **Stem Rust**



EXAMPLES OF DATA VISUALIZATION IN DIVERCILAND

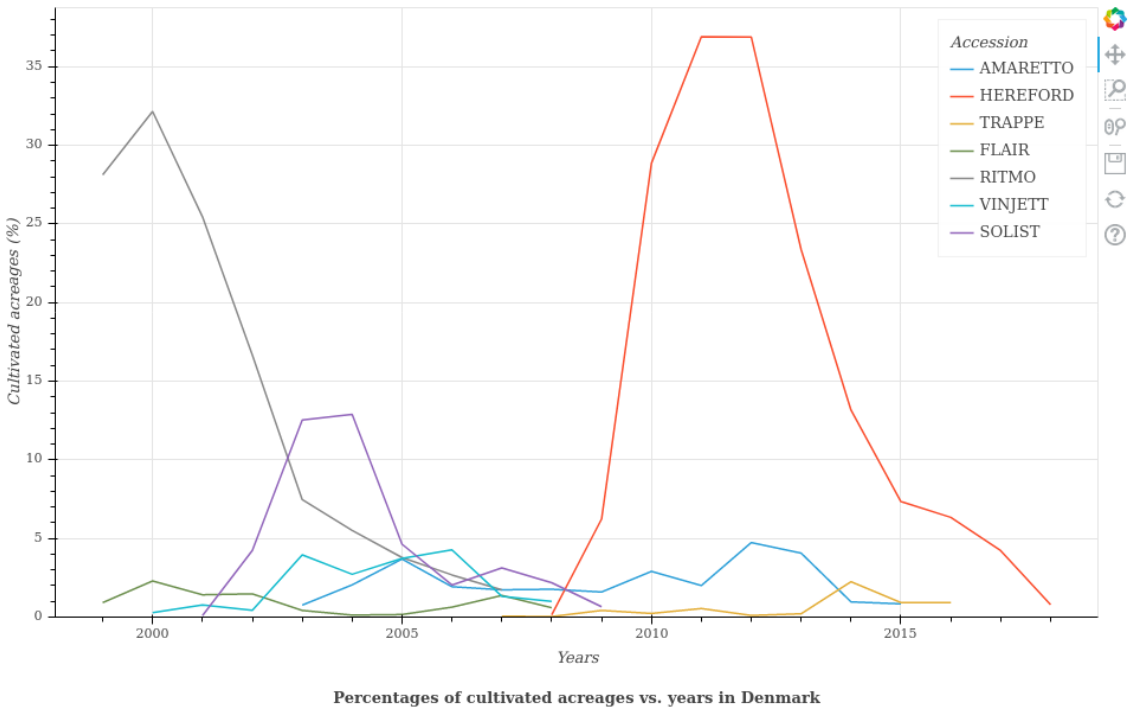


Accession's data card

- Accessible from search bar or accession viewer
- Displays information on the accession for several countries by using the country selector
- Presents catalogue data oldest and latest values, next to each trait
- History of values is viewable on a graph

EXAMPLES OF DATA VISUALIZATION IN DIVERCILAND

Life Cycle Viewer



Percentages of cultivated acreages vs. years in Denmark

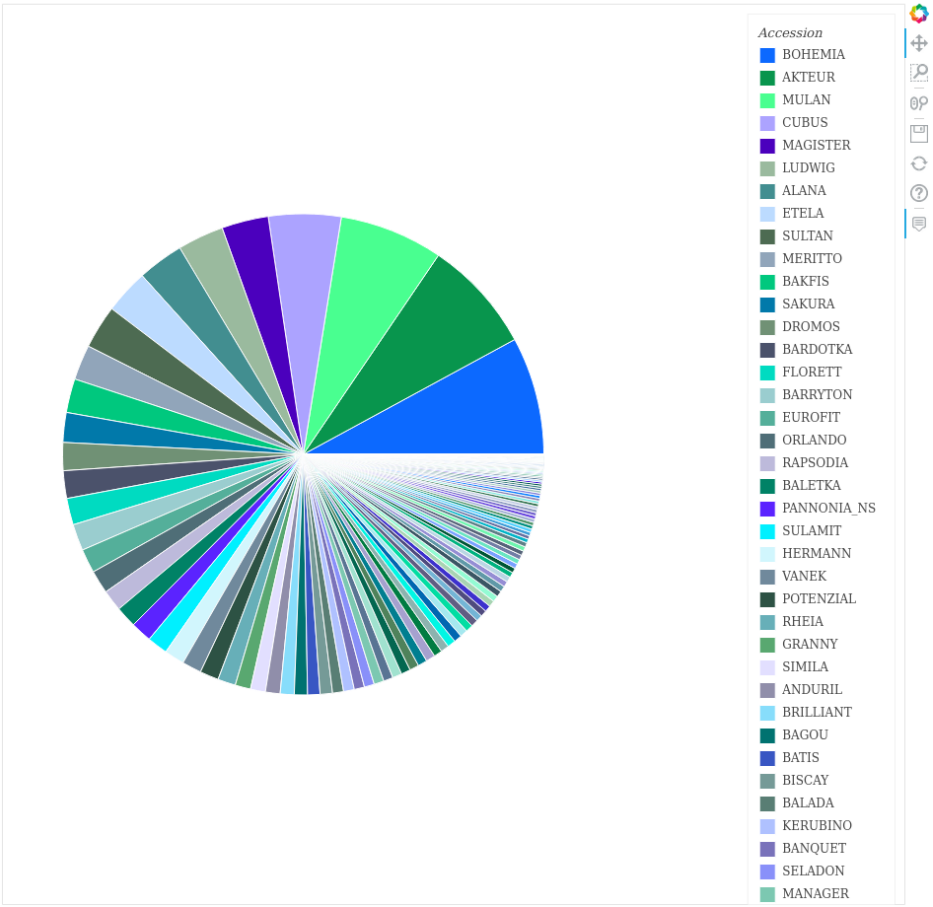
Life cycle viewer

- Allows to select desired accessions and range of years to represent on the graph

Variety repartition viewer

- Represent variety deployment at land unit scale
- Allows to export the data represented on the pie chart (only if the user has an admin status)

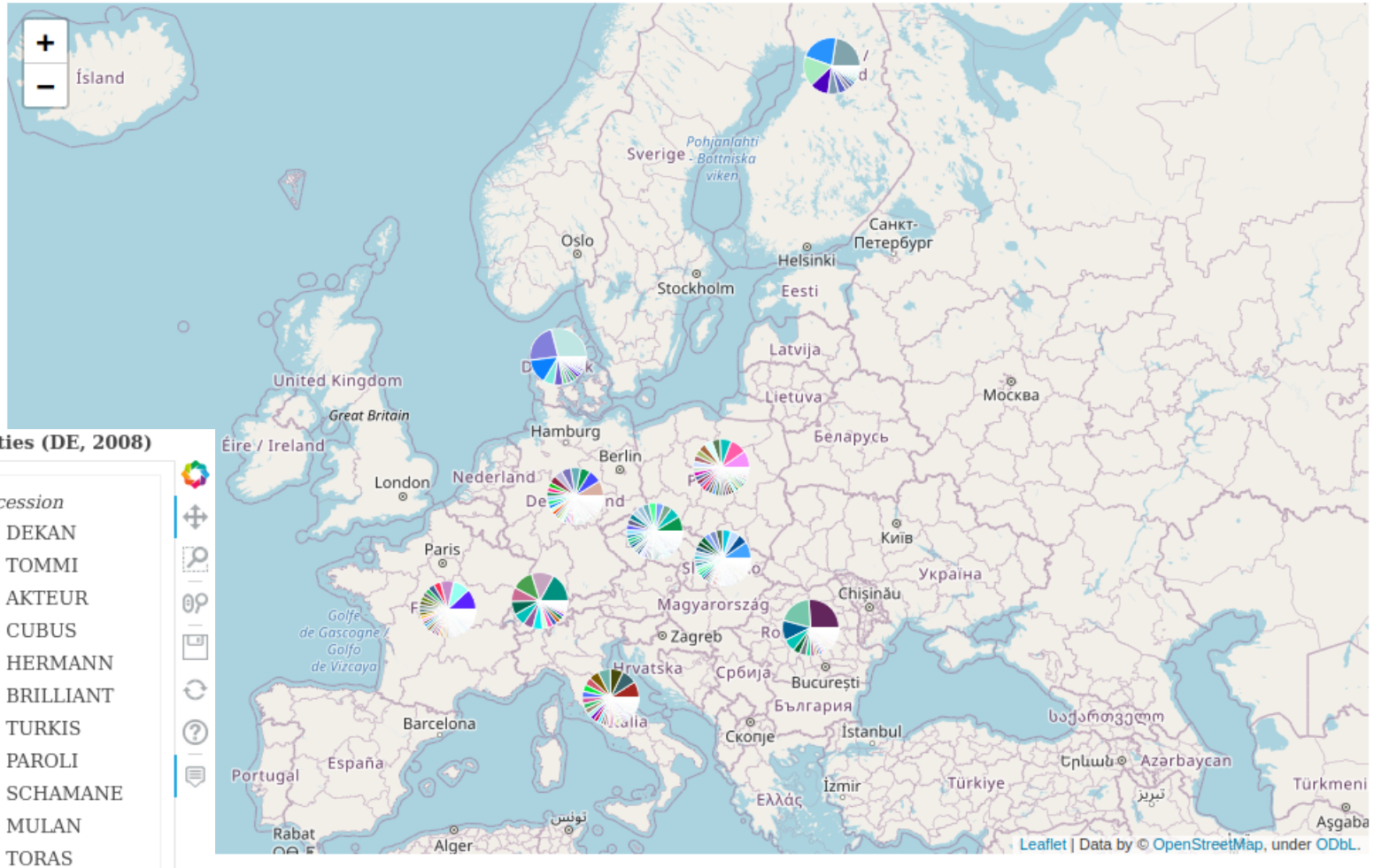
Repartition of cultivated acreages (%) by varieties: Czech Republic (CZ) in 2010

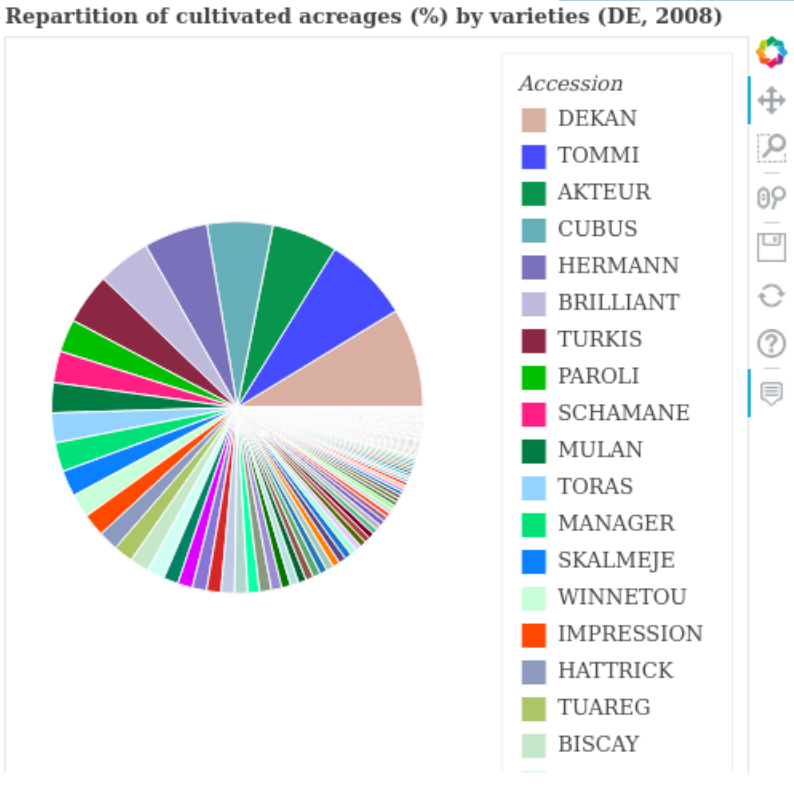


EXAMPLES OF DATA VISUALIZATION IN DIVERCILAND

Repartition on map

- Displays the deployment of the varieties on the landscape for European countries



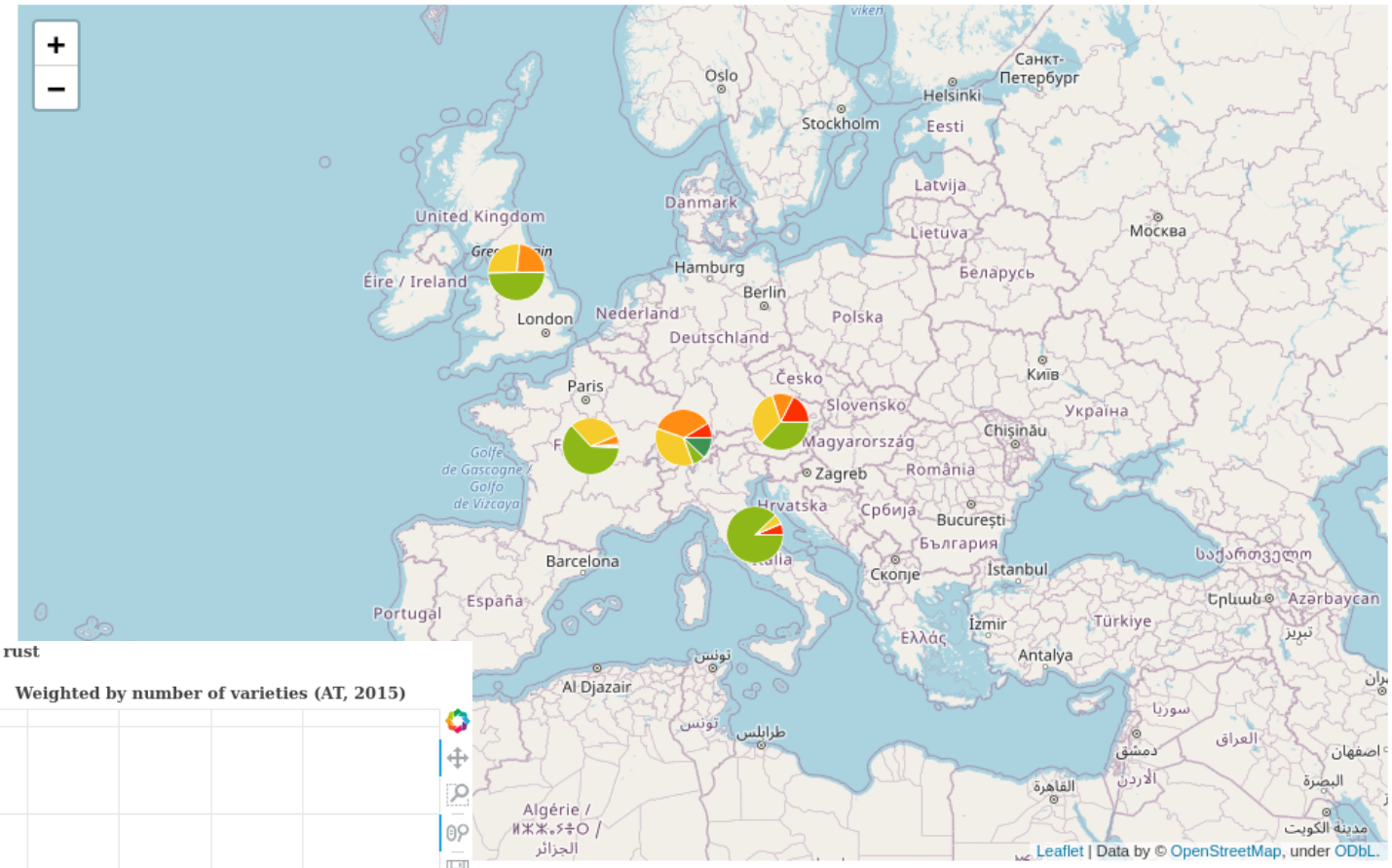


- A detailed view is accessible by clicking on the pie charts

EXAMPLES OF DATA VISUALIZATION IN DIVERCILAND

[Trait data repartition on map]

- Displays the resistance values to yellow rust according to the deployment of the varieties on the landscape for European countries



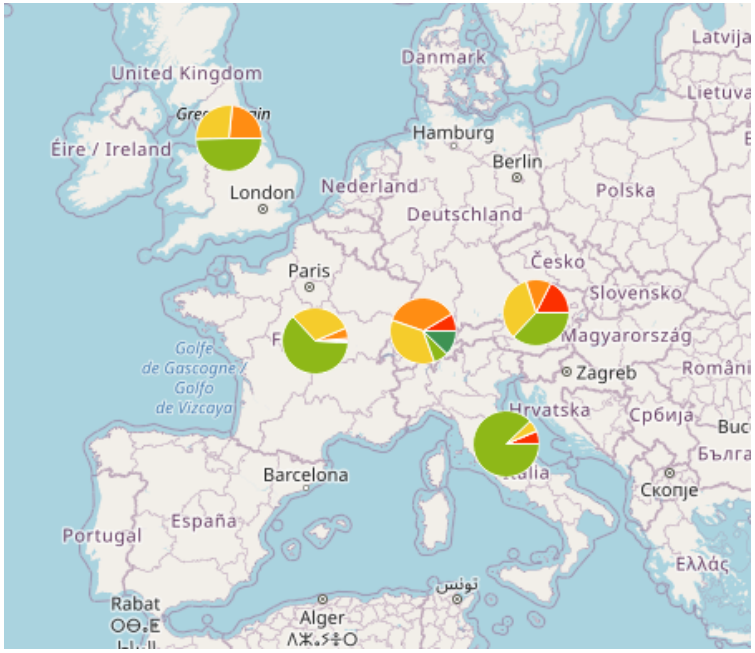
- A detailed view is accessible by clicking on the pie charts
- Data has been converted to a common scale: 1 (sensitive) → 5 (resistant)
- This scale is not an established standard

EXAMPLES OF DATA VISUALIZATION IN DIVERCILAND

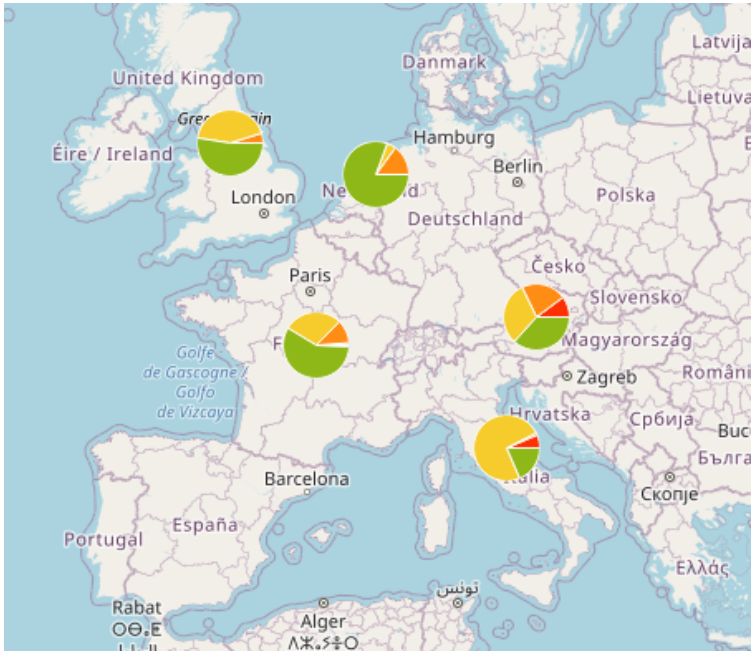
Trait data repartition on map

- Displays the resistance values to yellow rust according to the deployment of the varieties on the landscape for European countries

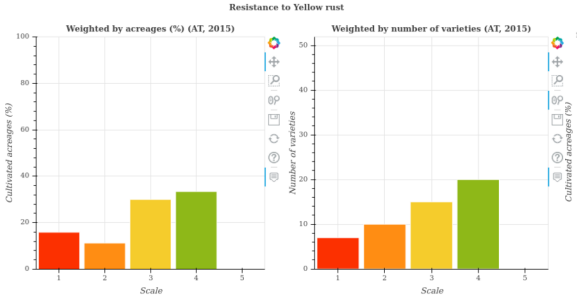
2015



2016



AT, 2015



AT, 2016

- A detailed view is accessible by clicking on the pie charts
- Data has been converted to a common scale: 1 (sensitive) → 5 (resistant)
- This scale is not an established standard

COMMON SCALE – EXAMPLE OF YELLOW RUST

Table made by Florence Dubs to convert countries' scales to a common scale for DiverCILand

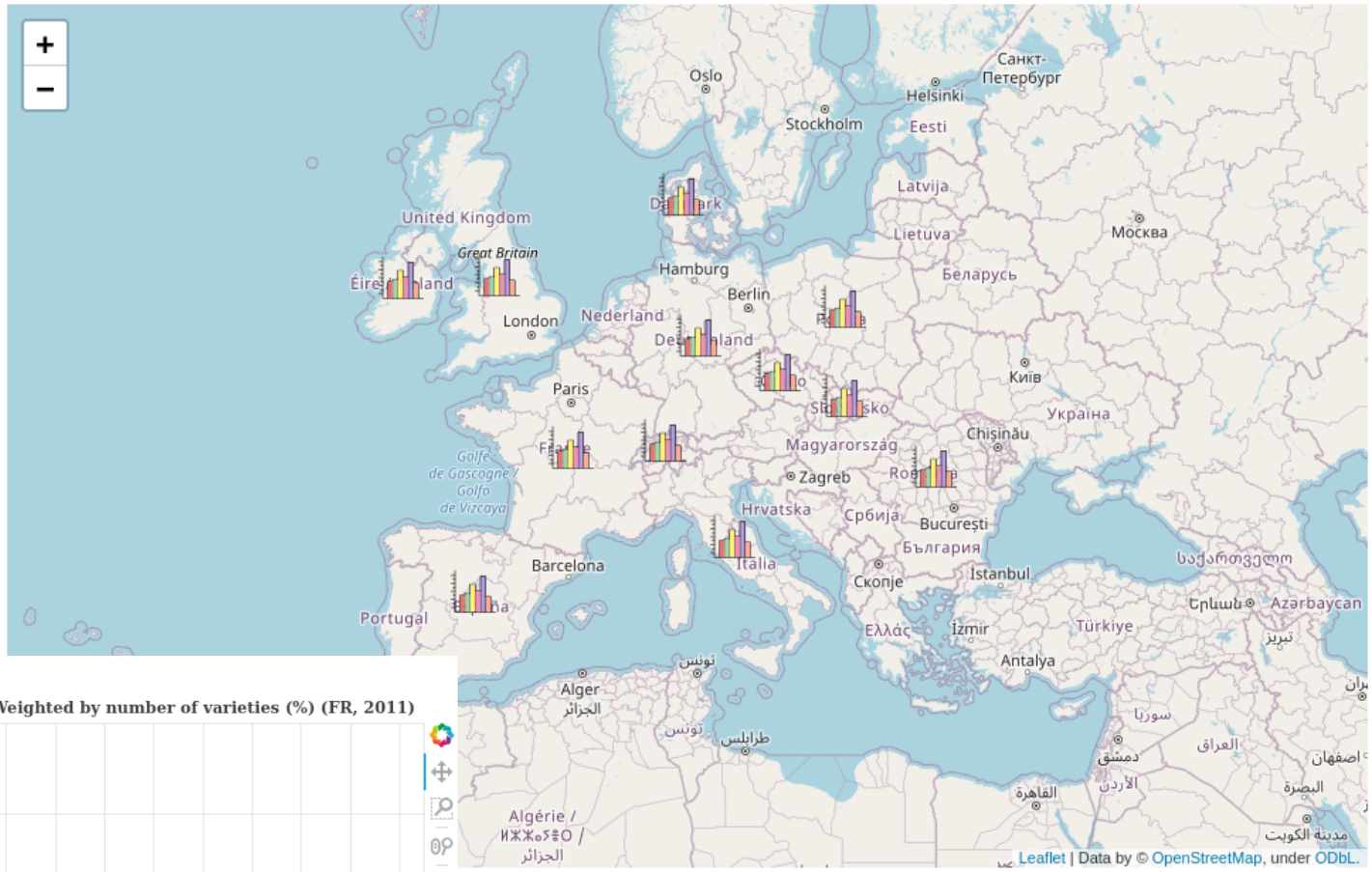
	scale FR		scale AT		scale NL	scale CH			
Résistant	**9**	résistant	**1**	1 = resistant	**9 ; 9,5**	9	tres_bonne	tres bon	+++
Résistant mais attaqué	**8**	assez résistant à résistant	**2 ; 2.5**		8 ; 8.5	8	bonne_a_tres_bonne		++(+)
	7	assez résistant	**3 ; 3,5**		7 ; 7.5	7	bonne	bon	++
Moyennement sensible	**6**	peu sensible	**4 ; 4.5**		**6 ; 6.5**	6	moyenne_a_bonne		+(+)
	5	assez sensible a peu sensible	**5 ; 5.5**		**5 ; 5.5**	5	bonne_a_moyenne	suffisant	+
Assez sensible	**4**	assez sensible	**6 ; 6.5**		4	4	moyenne	moyenne	Ø
	3	sensible à tres sensible	**7**		3.5	3	moyenne_a_faible	insuffisant	- ; -(-)
Sensible	**2**	sensible	**8**		2	2	faible	mauvais	-- , --(-)
	1	très sensible	**9**	9 = very susceptible	1	1	tres_faible	très mauvai	---

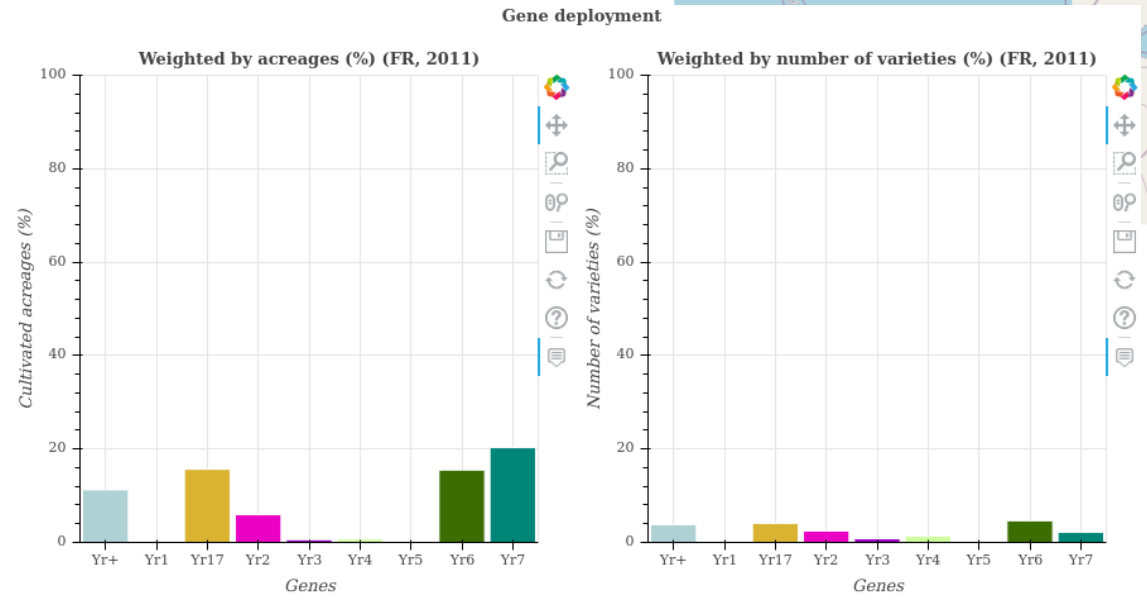
	scale IT	scale HU	
Résistant		1	Resistant
Résistant mais attaqué	Resistante	2	Moderately resistant
Moyennement sensible	Moderatamente resistante	3	Moderately susceptible
Assez sensible	Moderatamente suscettible	4	More responsive than medium
Sensible	Suscettible	5	Very responsive

EXAMPLES OF DATA VISUALIZATION IN DIVERCILAND

Candidate gene repartition on map

- Displays the repartition of candidate genes according to the deployment of the varieties on the landscape for European countries



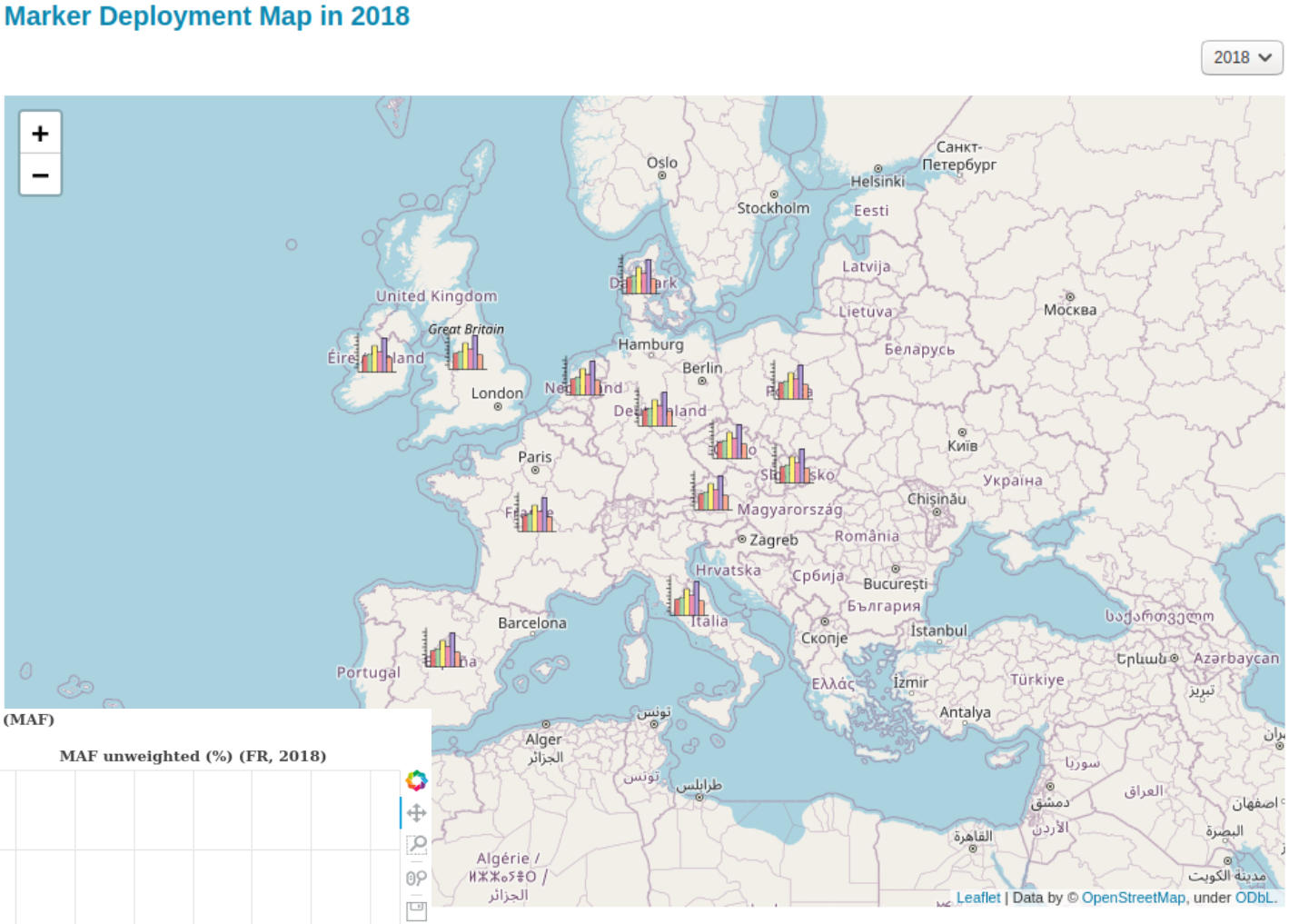


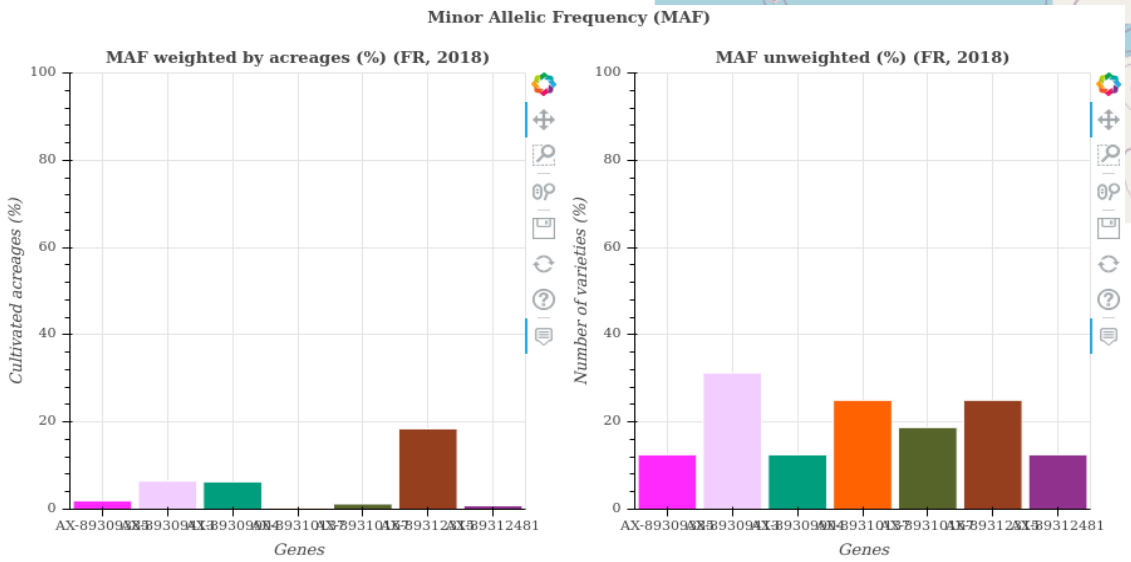
- Data of each country is accessible by clicking on the histogram icon on the map

EXAMPLES OF DATA VISUALIZATION IN DIVERCILAND

Marker repartition on map

- Displays the Minor Allelic Frequency (MAF) of markers and the MAF according to the deployment of the varieties on the landscape for European countries





- Data of each country is accessible by clicking on the histogram icon on the map

NA data (accessions without genotyping data) have been removed and the representation is based on 16 accessions instead of 369.

PERSPECTIVES

- Management of user acces to data

  → The results of a survey addressed to data providers showed that they were interested in the administration of their data in DiverCILand

  → Such data curation requires the partition data into datasets, enabling partners to do data management with secured access

- Development of webservices (Django REST framework) to interact with other IT frameworks and especially with the Wheat Rust Toolbox (prototype done)

- Funding (modest!): French project Co-Breeding (ANR – PEPR Agroecology and digital data)

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József Czapó & Gyula Vida


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Pawel Czembor & Tadeusz Oleksiak


Gunilla Berg & Jannie Hagman


Katarina Bučkova


Marianna Ittu


Lucy James


Lubbert van den Brink


Marja Jalli


Michael Oberforster


Philippe du Cheyron & Valérie Cadot


Steven Kildea


Uta Schnock & Jan Henrik Schmidt

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