

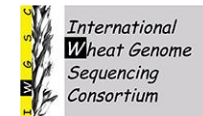
➤ INRAE and the Wheat Initiative

Michael Alaux

➤ Short bio

- Deputy director of the INRAE URGI unit
 - Scientific manager of the Plant Bioinformatics Facility
 - Leadership in wheat bioinformatics
- Chair of the WheatIS Expert Working Group of the Wheat Initiative
- Member of the IWGSC coordinating committee (head of the IWGSC Data Repository)
- WP or task leader of the ongoing wheat projects:
 - ❑ H2020 AGENT (Activated Genebank Network)
 - ❑ ANR D2KAB (Data to Knowledge in Agronomy and Biodiversity)
 - ❑ HE Pro-Wild (Protect and promote Crop Wild Relatives)

<https://eng-urgi.versailles-saclay.hub.inrae.fr/about-us/team/michael-alaux>



INRAE

INRAE and the Wheat Initiative

27/11/2024



> Outline

- The Wheat Initiative
- The WheatIS Expert Working Group
- WheatVIVO
- Data standards
- Data discovery
- Sharing experience



COORDINATING GLOBAL WHEAT RESEARCH

THE WHEAT INITIATIVE

TH OF JANUARY 2025 - APPLY NOW TO BECOME A MEMBER - NEW MEMBERS CAN ONLY BE RECIEVED UNTIL THE 6TH OF DECEMBER AND

➤ Wheat challenge

WHY WHEAT

WHEAT...

- is the world's most important food crop
- provides 20% of all calories and 20% of all protein in developing and developed countries
- is the most traded crop

BUT...

- wheat production is not meeting demand
- yields are stagnating
- demand is predicted to increase by 60% by 2050
- to meet this demand, global annual yield increases must rise from the current level of 1% per year to 1.6% per year by 2050.

All wheat producing countries share an urgent need to increase the rate of genetic gains for yield, tolerance to abiotic stresses, resistance to pathogens and pests, as well as to improve efficiency for sustainable wheat production, while ensuring high quality, safe and nutritious food products.



➤ Creation of the Wheat Initiative

- Proposed by research and funding organisations from several countries
- Endorsed by the G20 Agricultural Ministers to contribute to improving world food security
- Launched on 15 September 2011 in Paris



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➤ Strategy



THE WHEAT INITIATIVE

THE WHEAT INITIATIVE...

- provides a framework to establish and coordinate strategic research and organisation priorities for wheat research at the international level in both developed and developing countries.
- establishes and fosters communication between the research community, funders and global policy makers, and aims at securing efficient and long-term investments to meet wheat research and development goals.
- identifies, through its Expert Working Groups (EWG) research priorities and potential synergies, and nurtures collaborations between research and development programmes for wheat improvement.

**THE STRATEGY: CONNECTING WHEAT RESEARCHERS
WITH FUNDERS AND GLOBAL POLICY MAKERS
TO IMPROVE WHEAT**



> History

Coordinated by JKI (Germany)
scientific leader: Peter Langridge



Coordinated by INRA (France)
scientific leader: H  l  ne Lucas



French ministry of agriculture: Bruno Le Maire
INRA president: Marion Guillou



← chair: Michael Alaux (INRAE-URGI)



← chair: Taner Sen (USDA-ARS)



← Launch of the Wheat Information System Expert Working Group
chair: Hadi Quesneville (INRA-URGI)



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27/11/2024



➤ Strategic Research Agenda



Open Access Feature Paper Review

Meeting the Challenges Facing Wheat Production: The Strategic Research Agenda of the Global Wheat Initiative

by Peter Langridge ^{1,2,*} , Michael Alaux ³, Nuno Felipe Almeida ⁴ , Karim Ammar ⁵, Michael Baum ⁶, Faouzi Bekkaoui ⁷, Alison R. Bentley ⁵ , Brian L. Beres ⁸ , Bettina Berger ⁹ , Hans-Joachim Braun ⁵, Gina Brown-Guedira ¹⁰ , Christopher James Burt ¹¹, Mario Jose Caccamo ¹² , Luigi Cattivelli ¹³ , Gilles Charmet ¹⁴, Peter Civián ¹⁴, Sylvie Cloutier ¹⁵ , Jean-Pierre Cohan ¹⁶, Pierre J. Devaux ¹⁷ , Fiona M. Doohan ¹⁸, + Show full author list

¹ School of Agriculture, Food and Wine, Waite Campus, University of Adelaide, PMB1, Glen Osmond, SA 5064, Australia

² Wheat Initiative, JKI (Julius Kühn Institute), Federal Research Centre for Cultivated Plants, 14195 Berlin, Germany

³ INRAE, URGI, Université Paris-Saclay, 78026 Versailles, France

⁴ ASUR Plant Breeding, 60190 Estrées-Saint-Denis, France

⁵ CIMMYT (International Maize and Wheat Improvement Center), Texcoco 56237, Mexico

⁶ ICARDA (International Center for Agricultural Research in the Dry Areas), Rabat 10106, Morocco

⁷ INRA (National Institute for Agricultural Research), Rabat 10090, Morocco

⁸ AAFC (Agriculture & Agri-Food Canada), Lethbridge Research and Development Centre, Lethbridge, AB T1J 4B1, Canada

⁹ Australian Plant Phenomics Facility, School of Agriculture, Food and Wine, University of Adelaide, Urrbrae, SA 5064, Australia

¹⁰ USDA-ARS (United States Department of Agriculture—Agricultural Research Service), Plant Science Research, Raleigh, NC 27695, USA

+ Show full affiliation list

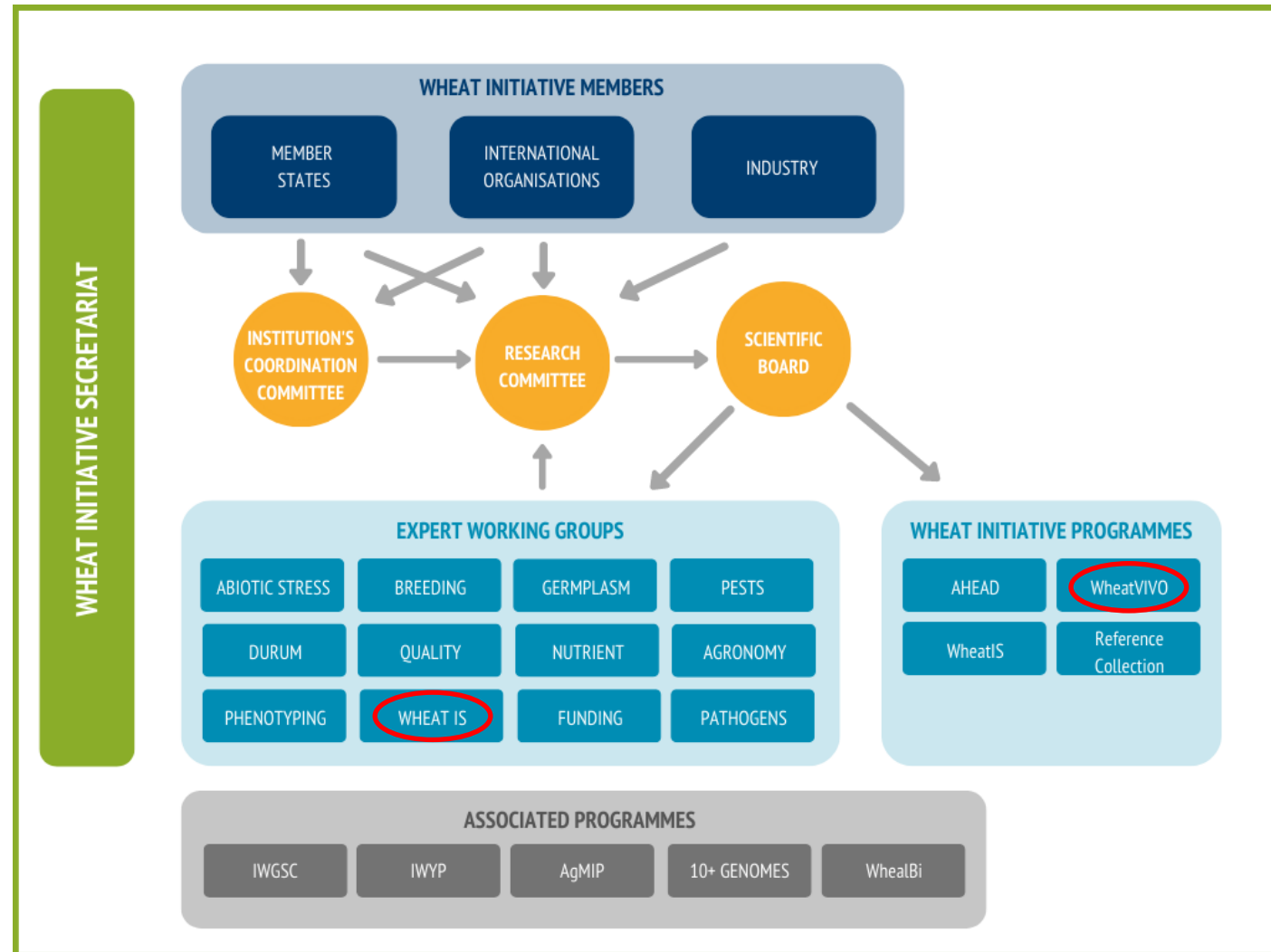
* Author to whom correspondence should be addressed.

Agronomy **2022**, *12*(11), 2767; <https://doi.org/10.3390/agronomy12112767>

Received: 26 September 2022 / Revised: 28 October 2022 / Accepted: 29 October 2022 /

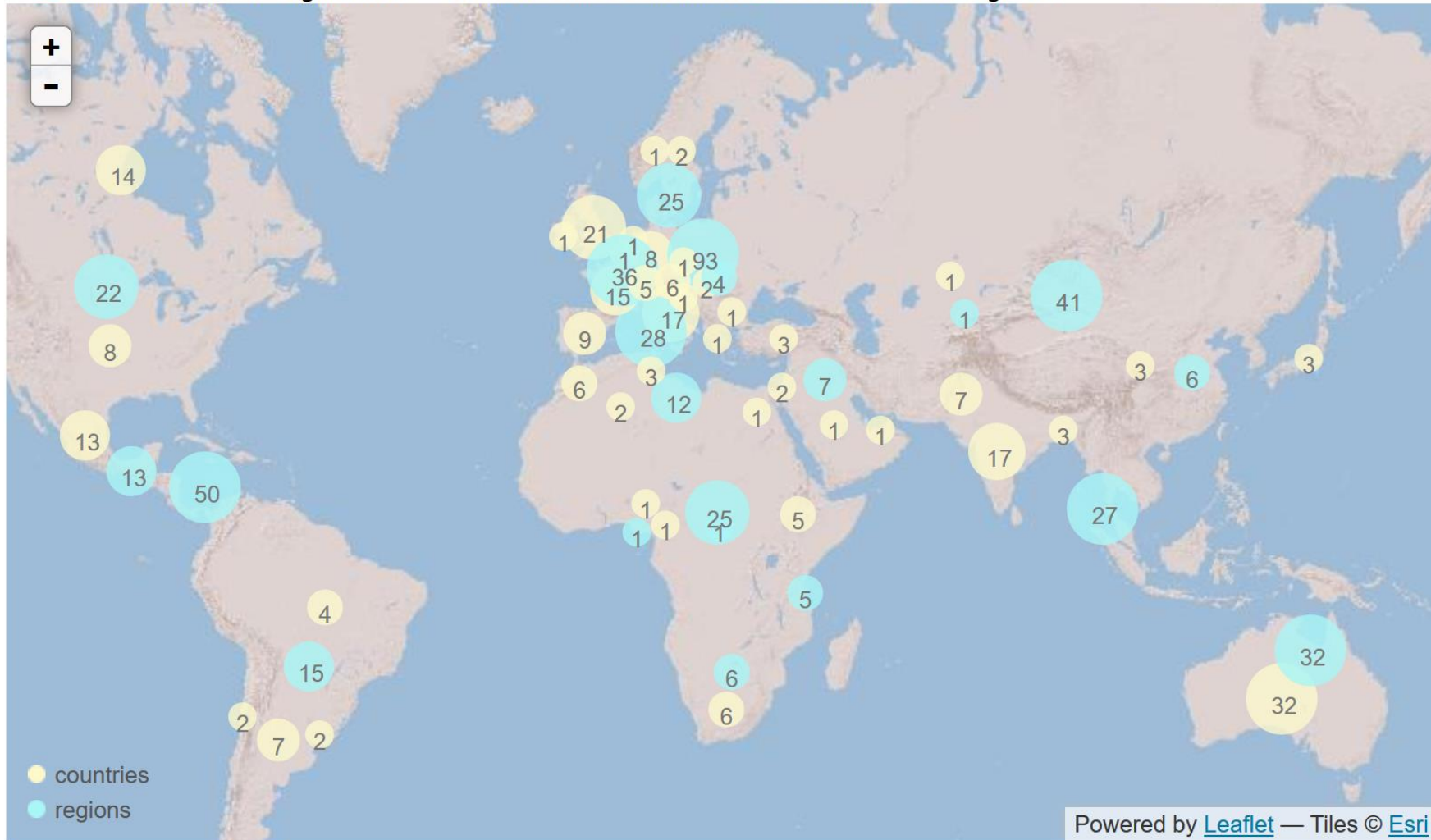
Published: 7 November 2022

> Organisation



Welcome to WheatVIVO

256 researchers or organizations with known locations in 64 countries and regions.



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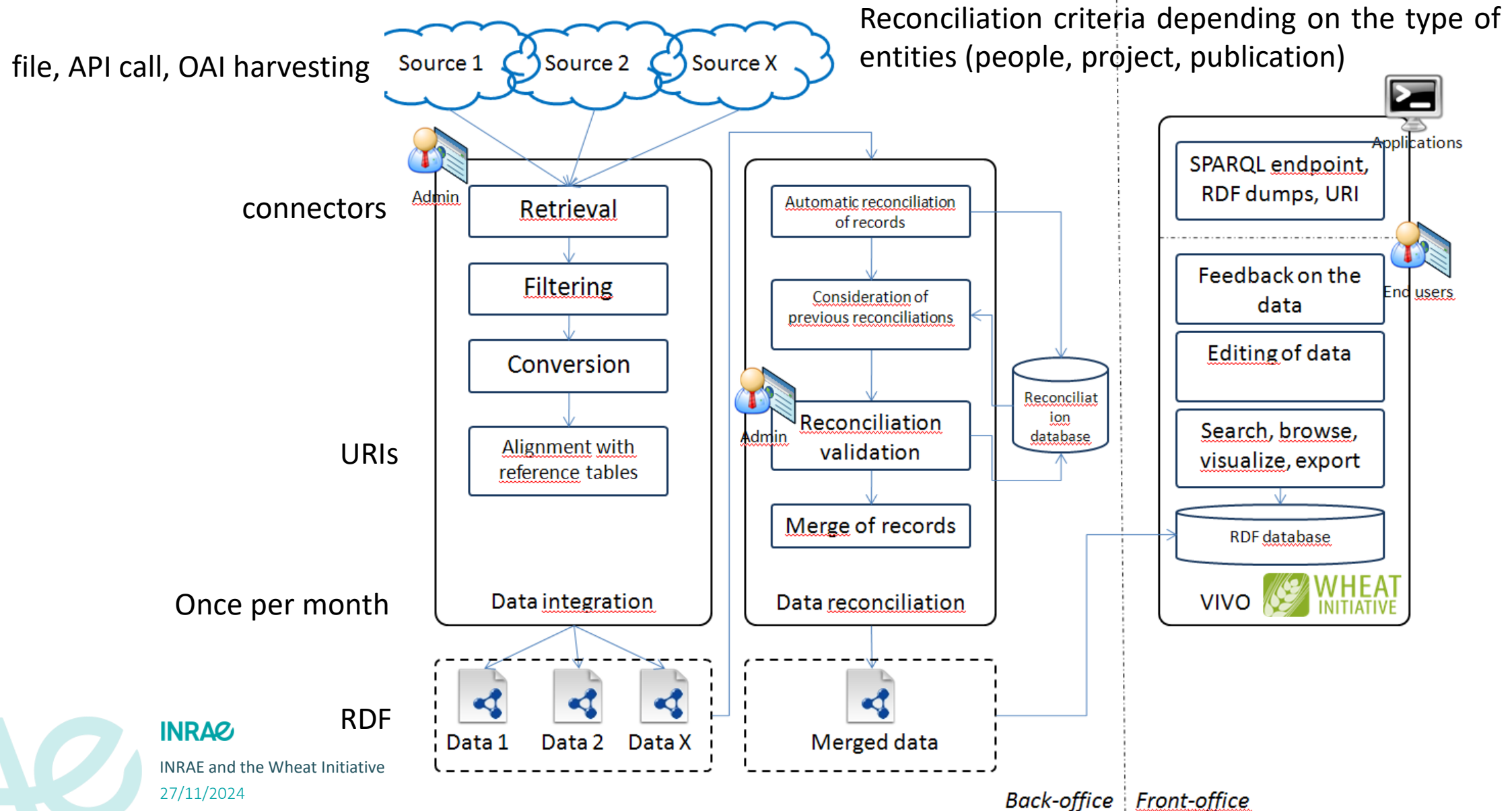
<https://wheatvivo.org/>

➤ Information Portal

- Project managed by the Delegation for Scientific and Technical Information of INRA (now INRAE DipSO)
 - Then transferred to JKI (Germany) for public launch in 2021
- Rely on the VIVO tool developed by Cornell University with additional requirements
 - Ontology extension, templates adaptation
 - Data integration
 - Data reconciliation



➤ Back and front office



➤ Sample of data sources

Name of the source	Type of connector expected	Format(s)	If VIVO, version from 09/09/2015	Information available	Estimated volume of data	URL
Wheat Initiative	CSV/XML	CSV	n/a	People	~800 records from researchers registered on the portal	http://www.wheatinitiative.org/
Vivo INRA	RDF	RDF	1.7	People, organizations, publications	~10000 publications	The data will be made available on the server of the application
Vivo USDA	VIVO	RDF	Soon 1.8	People, organizations, projects/funding, publications	~250 researchers + 3 organizations + ~250 projects + ~500 publications	http://vivo.usda.gov/
Vivo University of Pennsylvania	VIVO	RDF	1.5	People, organizations, publications	~100 researchers + their publications + associated institution	https://vivo.upenn.edu/vivo/
Vivo University of Melbourne	VIVO	RDF	1.4 to be upgraded to 1.8 shortly	People, organizations, publications	~100 researchers + their publications + associated institution	http://findanexpert.unimelb.edu.au/
Vivo University of Florida	VIVO	RDF	1.7 with extensions	Organizations, publications	~100 researchers + their publications + associated institution	https://vivo.ufl.edu/



➤ Example

We are continually maintaining and improving the site and welcome your input and suggestions either via the short survey that will pop up or via wheatvivo@julius-kuehn.de. We appreciate your support.

WheatVIVO is an open-access web portal providing information about wheat researchers and projects globally across the public-private wheat community: who is doing what, where and with whom. WheatVIVO is a useful tool to help researchers find partners and develop collaborations, for students and post-docs to identify labs in which they would like to work, and for policy makers and funding agencies to better understand the research priorities in different countries.

Browse or search information on researchers, labs, grants, projects and publications.

Search WheatVIVO

Welcome to WheatVIVO

225 researchers or organizations with known locations in 64 countries and regions.



Statistics

28 _k	2	4 _k	467	325	63 _k
People	Events	Organisations	Projects	Locations	Publications

<https://wheatvivo.org/>

INRAE

INRAE and the Wheat Initiative

27/11/2024



Example

Alaux, Michael | Person



Contact Info

✉ michael.alaux@inrae.fr

Websites

➤ <https://eng-urgi.versailles-grignon.hub.inrae.fr/about-us/team/michael-alaux>

➤ <https://eng-urgi.versailles-grignon.hub.inrae.fr/about-us/team/michael-alaux>

Publications Contact Identity View All

Publications

selected publications

article

[Mapping bread wheat trait ontologies for semantic interoperability \[version 1; peer review: awaiting peer review\]](#) 2024 4

[SynthyViewer: a comparative genomics-driven translational research tool](#). Database. 2023 6

[Breeding for Economically and Environmentally Sustainable Wheat Varieties: An Integrated Approach from Genomics to Selection](#). Biology. 2022 10

[Capturing Wheat Phenotypes at the Genome Level](#). Frontiers in Plant Science. 2022 21

[Meeting the Challenges Facing Wheat Production: The Strategic Research Agenda of the Global Wheat Initiative](#). Agronomy. 2022 19

... more

book

[Genomics of Plant Genetic Resources](#). 2014

[Genomics of Plant Genetic Resources - Volume 1. Managing, sequencing and mining genetic resources](#) 2013

chapter

[Wheat Data Integration and FAIRification: IWGSC, GrainGenes, Ensembl and Other Data Repositories](#). The Barley Genome. 2024 10

Contact

full name

Michael Alaux

mailing address

Versailles

France

geographic location

France

Identity

ORCID ID

<https://orcid.org/0000-0001-9356-4072>

Positions

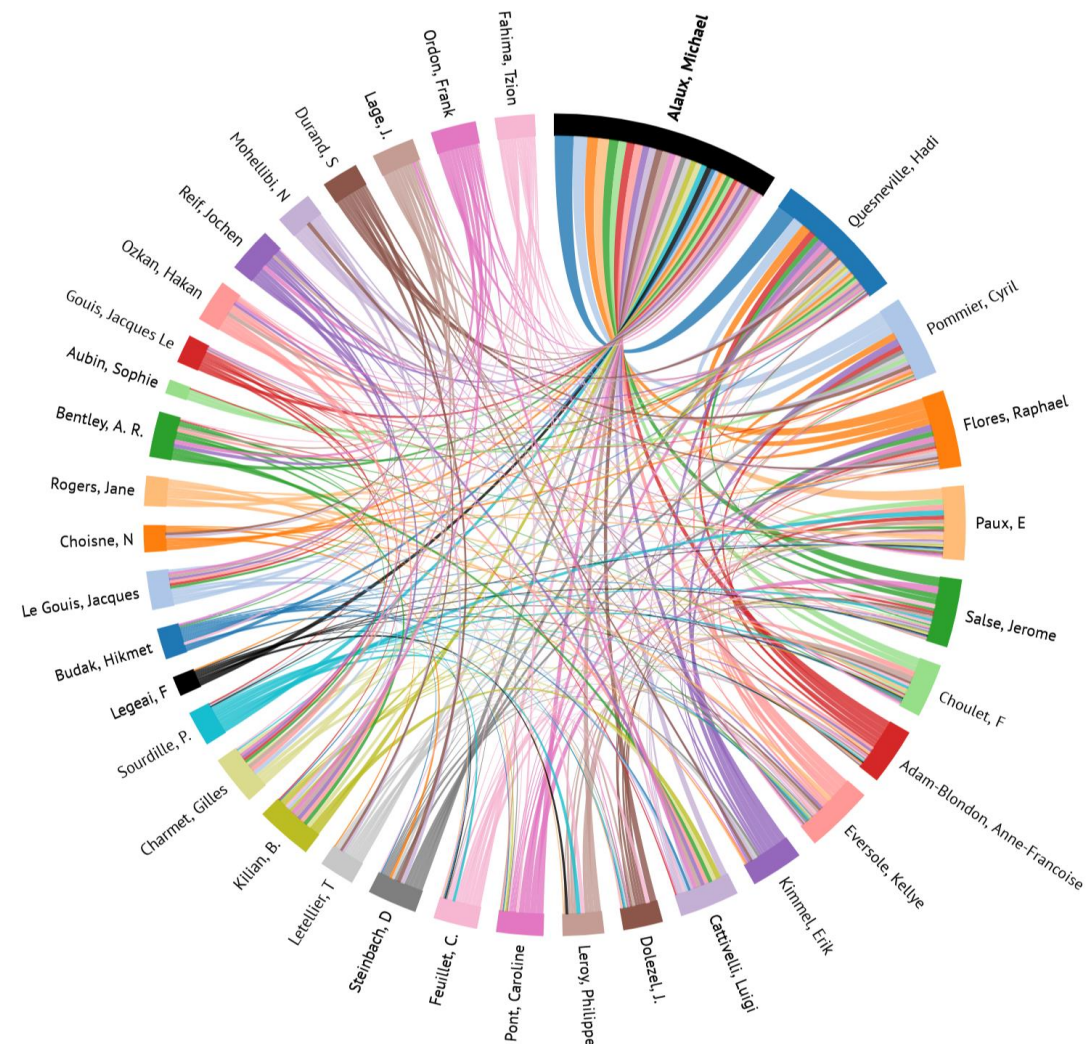
➤ Bioinformatics project manager, [INRAE-URGI](#)

Publications in VIVO

60 in the last 10 full years

Co-author Network

Map of Science





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<http://www.wheatis.org/>

➤ Build the community

- Building an expert working group
 - focus on recruiting diverse profiles covering important countries or geographical areas, institutions, interest groups and scientific fields for wheat research
- Seeking help from other communities
 - Wheat Data Interoperability Working Group was created as one of the Research Data Alliance working groups
- Surveys
 - usage of data standards in the wheat research community
- Fundings
 - Meetings (e.g. annual meeting at PAG USA)
 - Workshops

OPINION ARTICLE

 Check for updates

Building a successful international research community through data sharing: The case of the Wheat Information System (WheatIS)

[version 1; peer review: 2 approved, 1 approved with reservations]

Taner Z. Sen¹, Mario Caccamo², David Edwards³,  Hadi Quesneville^{4,5}

 Author details



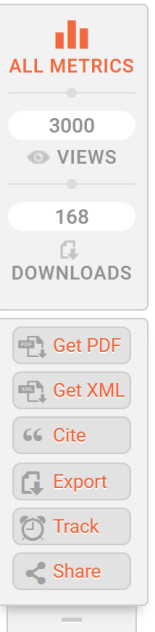
This article is included in the [Agriculture, Food and Nutrition](#) gateway.

Abstract

The International Wheat Information System (WheatIS) Expert Working Group (EWG) was initiated in 2012 under the Wheat Initiative with a broad range of contributing organizations. The mission of the WheatIS EWG was to create an informational infrastructure, establish data standards, and build a single portal that allows search, retrieval, and display of globally distributed wheat data sets that are indexed in standard data formats at servers around the world. The web portal at WheatIS.org was released publicly in 2015, and by 2020, it expanded to 8 geographically-distributed nodes and around 20 organizations under its umbrella.

In this paper, we present our experience, the challenges we faced, and the answer we brought for establishing an international research community to build an informational infrastructure. Our hope is that our experience with building wheatis.org will guide current and future research communities to facilitate institutional and international challenges to create global tools and resources to help their respective scientific communities.

<https://doi.org/10.12688/f1000research.23525.1>



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➤ Build the community

- A successful result
 - WheatIS data discovery
- Outreach
 - Trainings
 - Website and social media
 - Joint actions with other EWGs

OPINION ARTICLE

 Check for updates

Building a successful international research community through data sharing: The case of the Wheat Information System (WheatIS)

[version 1; peer review: 2 approved, 1 approved with reservations]

Taner Z. Sen¹, Mario Caccamo², David Edwards³,  Hadi Quesneville^{4,5}

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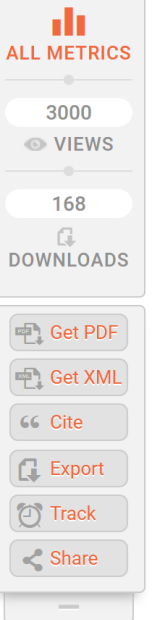
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> Expert working group

MAIN RESEARCH AREA

- Information systems are recognized today as essential tools for federating scientific communities. They facilitate the sharing of data between research groups, accelerating knowledge production.
- The Wheat Information System EWG federates the diverse information sources (e.g. genetic, genomic, phenotypic, environmental), allowing their findability and integration.
- The EWG optimises the exploitation of the available resources by ensuring interoperability, allowing searching across databases, providing access to bioinformatics tools for data analysis, and bringing all major sources of data related to wheat together in a single-entry point with a user-friendly interface for the biologists and breeders.

PURPOSE OF THE EWG

Creation and animation of a network of experts, collaborating to provide the scientific community with wheat genetic and genomic data.

Sen et al., Building a successful international research community through data sharing: The case of the Wheat Information System (WheatIS), F1000Research 2020 (<https://doi.org/10.12688/f1000research.23525.1>)

Standards, protocols, and guidelines for wheat data sharing in keeping with different international bioinformatics initiatives.

Dzale Yeumo et al., Developing data interoperability using standards: A wheat community use case, F1000Research 2017 (<https://doi.org/10.12688/f1000research.12234.2>)

A single entry point for the wheat community to find available data through a full text search engine (WheatIS Data Discovery), allowing searching data in all the wheat databases around the world.

MAIN CHALLENGES IN THE FIELD

- To maintain effective communication with stakeholders and users to ensure proper tool development and data integration.
- To ensure up-to-date data in the WheatIS Data Discovery.
- To index new databases (especially from Asia) in the WheatIS Data Discovery.
- To improve the FAIRness of the data and metadata.

The EWG is open to Early Career Researchers



EWG CHAIRS AND CO-CHAIRS



Michael ALAUX
(INRAE)



Mario CACCAMO
(NIAB)



Taner SEN
(USDA-ARS)



Sarah DYER
(EMBL-EBI)



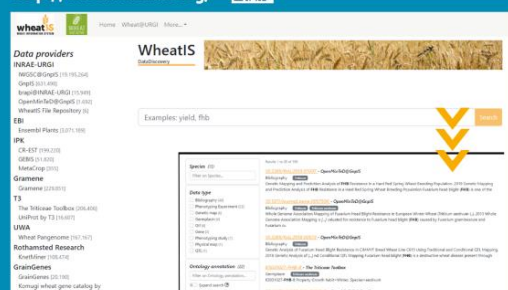
Dave EDWARDS
(UWA)

BECOME A MEMBER
#WHEATTHEWORLD




20 experts from Europe, America, Asia, Oceania including 5 early career researchers

WheatIS website
<http://www.wheatis.org/>



WheatIS Data Discovery
<https://urgi.versailles.inrae.fr/wheatis/>

Webinar
<https://ess.elixir-europe.org/materials/wheatis-datadiscovery-webinar>

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> Website

[About](#) [Collaborators](#) [Search](#) [Data Standards](#) [Submit Data](#) [Tools](#) [Links](#) [WheatIS Nodes](#)

WheatIS



wheatIS
WHEAT INFORMATION SYSTEM

About

This project aims at building an International Wheat Information System, called hereafter WheatIS, to support the wheat research community. The main objective is to provide a single-access web base system to access to the available data resources and bioinformatics tools.

This project is based on the principles listed below:

- Collective building of the WheatIS to better respond to the needs of the international wheat community;
- Incremental implementation to offer rapidly an operational information system;
- Emphasis on Quality Assurance to serve as a framework for an approach with incremental implementation;
- Promotion of an open-access model for data exchange;
- Reliance on a distributed system;
- Use of Virtual Machine and Cloud Computing technologies to facilitate sharing data and tools;
- Promotion of the visibility of each participating platform to contribute to their sustainability.

If you have questions regarding this Wheat Information System project, please contact:
wheatis-contact @ wheatis.org

Help desk: If you have questions regarding this Wheat Information System project, please contact:
wheatis-contact @ wheatis.org

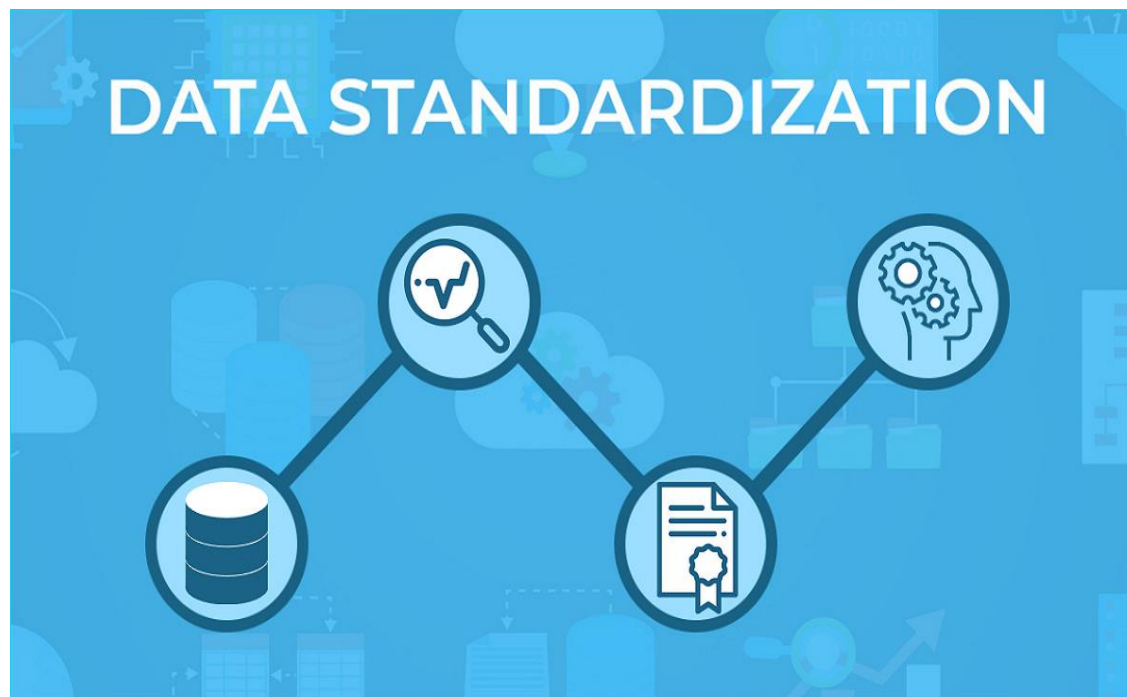


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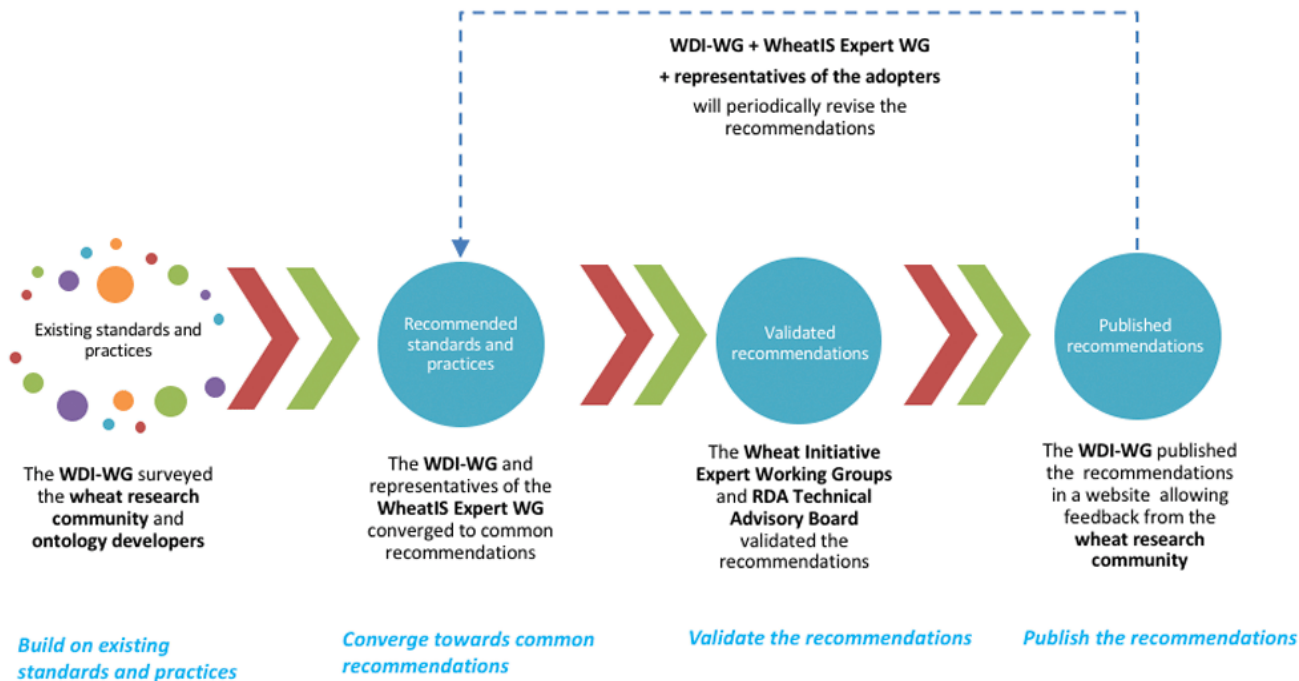
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➤ RDA Wheat Data Interoperability Working Group

- Community driven methodology



OPINION ARTICLE

Check for updates

REVISED Developing data interoperability using standards: A wheat community use case [version 2; peer review: 2 approved]

Esther Dzale Yeumo¹, Michael Alaux², Elizabeth Arnaud³, Sophie Aubin¹, Ute Baumann⁴, Patrice Buche⁵, Laurel Cooper⁶, Hanna Ćwiek-Kupczyńska⁷, Robert P. Davey⁸, Richard Allan Fulss⁹, Clement Jonquet^{10,11}, Marie-Angélique Laporte³, Pierre Larmande^{12,13}, Cyril Pommier¹⁴, Vassilis Protonotarios¹⁴, Carmen Reverte¹⁵, Rosemary Shrestha⁹, Imma Subirats¹⁶, Aravind Venkatesan¹², Alex Whan¹⁷, Hadi Quesneville²

Author details



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In this article, we present a joint effort of the wheat research community, along with data and ontology experts, to develop wheat data interoperability guidelines. Interoperability is the ability of two or more systems and devices to cooperate and exchange data, and interpret that shared information. Interoperability is a growing concern to the wheat scientific community, and agriculture in general, as the need to interpret the deluge of data obtained through high-throughput technologies grows. Agreeing on common data formats, metadata, and vocabulary standards is an important step to obtain the required data interoperability level in order to add value by encouraging data sharing, and subsequently facilitate the extraction of new information from existing and new datasets.

During a period of more than 18 months, the RDA Wheat Data Interoperability Working Group (WDI-WG) surveyed the wheat research community about the use of data standards, then discussed and selected a set of recommendations based on consensual criteria. The recommendations promote standards for data types identified by the wheat research community as the most important for the coming years: nucleotide sequence variants, genome annotations, phenotypes, germplasm data, gene expression experiments, and physical maps. For each of these data types, the guidelines recommend best practices in terms of use of data formats, metadata standards and ontologies. In addition to the best practices, the guidelines provide examples of tools and implementations that are likely to facilitate the adoption of the recommendations.

To maximize the adoption of the recommendations, the WDI-WG used a community-driven approach that involved the wheat research community from the start, took into account their needs and practices, and provided them with a framework to keep the recommendations up to date. We also report this approach's potential to be generalizable to other (agricultural) domains.

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<https://doi.org/10.12688/f1000research.12234.2>

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➤ RDA Wheat Data Interoperability Working Group

- Dissemination
 - Website
 - Agroportal for wheat ontologies
- Adoption

OPINION ARTICLE

Check for updates

REVISED

Developing data interoperability using standards: A wheat community use case [version 2; peer review: 2 approved]

Esther Dzale Yeumo¹, Michael Alaux , Elizabeth Arnaud³, Sophie Aubin¹, Ute Baumann⁴, Patrice Buche⁵, Laurel Cooper , Hanna Ćwiek-Kupczyńska⁷, Robert P. Davey , Richard Allan Fulss⁹, Clement Jonquet , Marie-Angélique Laporte³, Pierre Larmande , Cyril Pommier , Vassilis Protonotarios , Carmen Reverte , Rosemary Shrestha⁹, Imma Subirats¹⁶, Aravind Venkatesan , Alex Whan¹⁷,  Hadi Quesneville 

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<https://doi.org/10.12688/f1000research.12234.2>



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> Dedicated website

Wheat Data Interoperability Guidelines

[Home](#) [Guidelines](#) [Ontologies & Vocabularies](#) [Use cases](#) [Getting involved](#) [About](#)



Welcome

These recommendations have been prepared by members of the [Wheat Data Interoperability Working Group](#) (WG), one of the WGs of the Research Data Alliance and the only WG of the [Agriculture Data Interoperability Interest Group](#). The group is coordinated by members of the [Wheat Initiative](#), a global initiative that aims to reinforce synergies between bread and durum wheat national and international research programmes to increase food security, nutritional value and safety while taking into account societal demands for sustainable and resilient agricultural production systems. All the standards and databases presented in these recommendations are referenced into the [FAIRsharing](#) website.

More specifically, the WG aims to:



Promote the adoption of common standards, vocabularies and best practices for Wheat data management



Facilitate access, discovery and reuse of wheat data



Facilitate wheat data integration

Guidelines

Under the submenus of this section you will find information on the best practices, tools, recommendations and examples to create, manage and share data related to Wheat. It includes subsections for each of the following data types:

What are currently the most used and relevant vocabularies in the context of Wheat Initiative?

From December 2014 to January 2015 the editorial team conducted a survey “Towards a Comprehensive Overview of Ontologies and Vocabularies for Research on Wheat”. The objective was to collect information about the visibility, interoperability, domain, content and other technical aspects of relevant ontologies and vocabularies. As a result, in February 2015 a report ([link](#)) was published, and also a list of vocabularies listed as follows:

1. AGROVOC
2. Biorefinery
3. CAB Thesaurus (CABT)
4. Cell Ontology (CL)
5. Chemical Entities of Biological Interest (ChEBI)
6. Crop Ontology (CO)
7. Crop Research Ontology – part of Crop Ontology (CO_715)
8. Environment Ontology (ENVO)
9. Experimental Factor Ontology (EFO)
10. Feature Annotation Location Description Ontology (FALDO)
11. NAL Thesaurus (NALT)
12. Phenotype And Trait Ontology (PATO)
13. Plant Experimental Conditions Ontology (Plant Environment Ontology, EO, may be changing to PECO)

Links

FAIRsharing



Click on the titles for details

1. QUERY ON TRIAL DATA ASSOCIATED WITH VARIETIES
2. DECIPHER THE EFFECT OF SNPS
3. IDENTIFICATION OF WHEAT GENES THAT CONTROL ROOT GROWTH
4. QUERY DATA BY GERMLASM/GENOTYPE
5. QUERY PHENOTYPE TRIALS TO BUILD INTEGRATIVE DATASET FOR PHENOTYPE OR GENETIC ANALYSIS.
6. QUERY ON GERMLASM WITH SPECIFIC TRAITS

<https://ist.blogs.inrae.fr/wdi/>



WheatIS

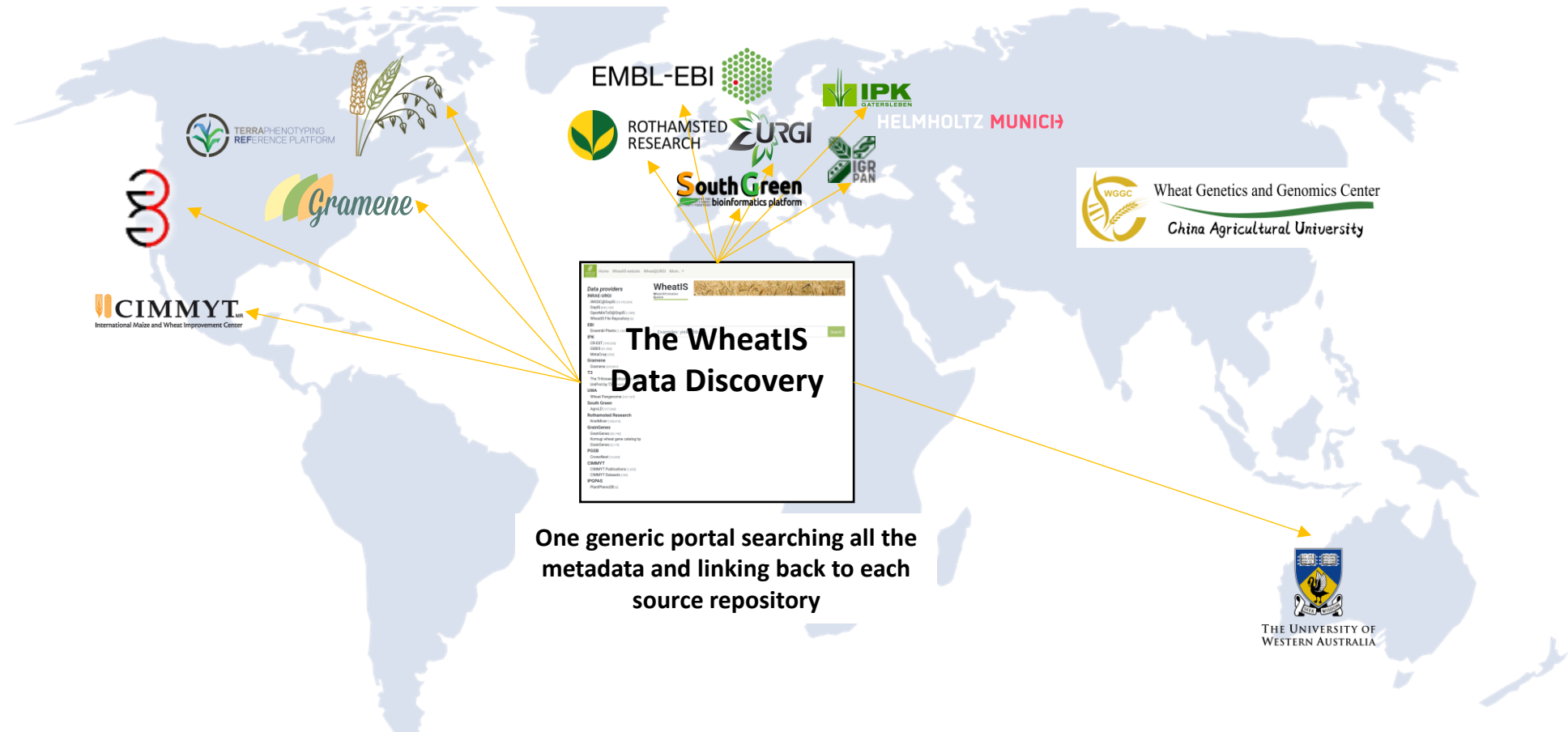
DataDiscovery

Exemples : yield, fhb

Rechercher

<https://urgi.versailles.inrae.fr/wheatis>

➤ Federated data portal



> Repositories

INRAE-URGI

IWGSC@GnplS [19,195,264]

GnplS [624,827]

brapi@INRAE-URGI [15,949]

OpenMinTeD@GnplS [1,692]

WheatIS File Repository [6]

Research Data Gouv [4]

CAU

TGT [5,041,169]

wGRN [270,235]

WheatUnion [105,200]

pNOGmap [118]

EBI

Ensembl Plants [1,954,199]

Gramene

Gramene Plants [1,954,199]

IPK

CR-EST [199,220]

GEBIS [51,820]

MetaCrop [355]

e!DAL - PGP Repository [144]

T3

The Triticeae Toolbox [206,406]

UniProt by T3 [16,607]

UWA

Wheat Pangenome [167,167]

Rothamsted Research

KnetMiner [108,474]

GrainGenes

GrainGenes [20,190]

Komugi wheat gene catalog by
GrainGenes [3,119]

PGSB

CrowsNest [13,324]

CIMMYT

CIMMYT Publications [1,600]

CIMMYT Datasets [183]

EVA

brapi@EVA [710]

TERRA-REF

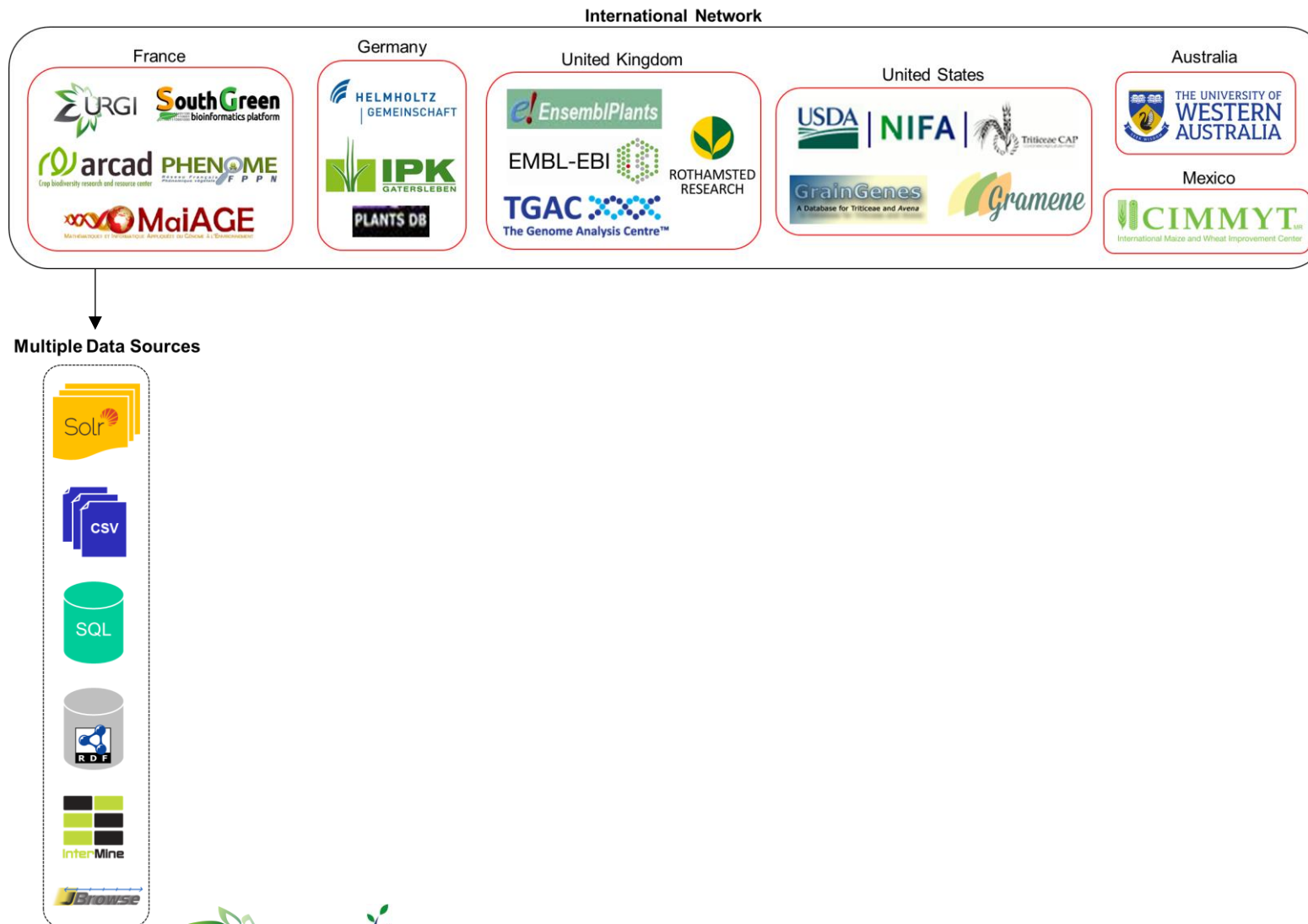
brapi@TERRA-REF [284]

IPGPAS

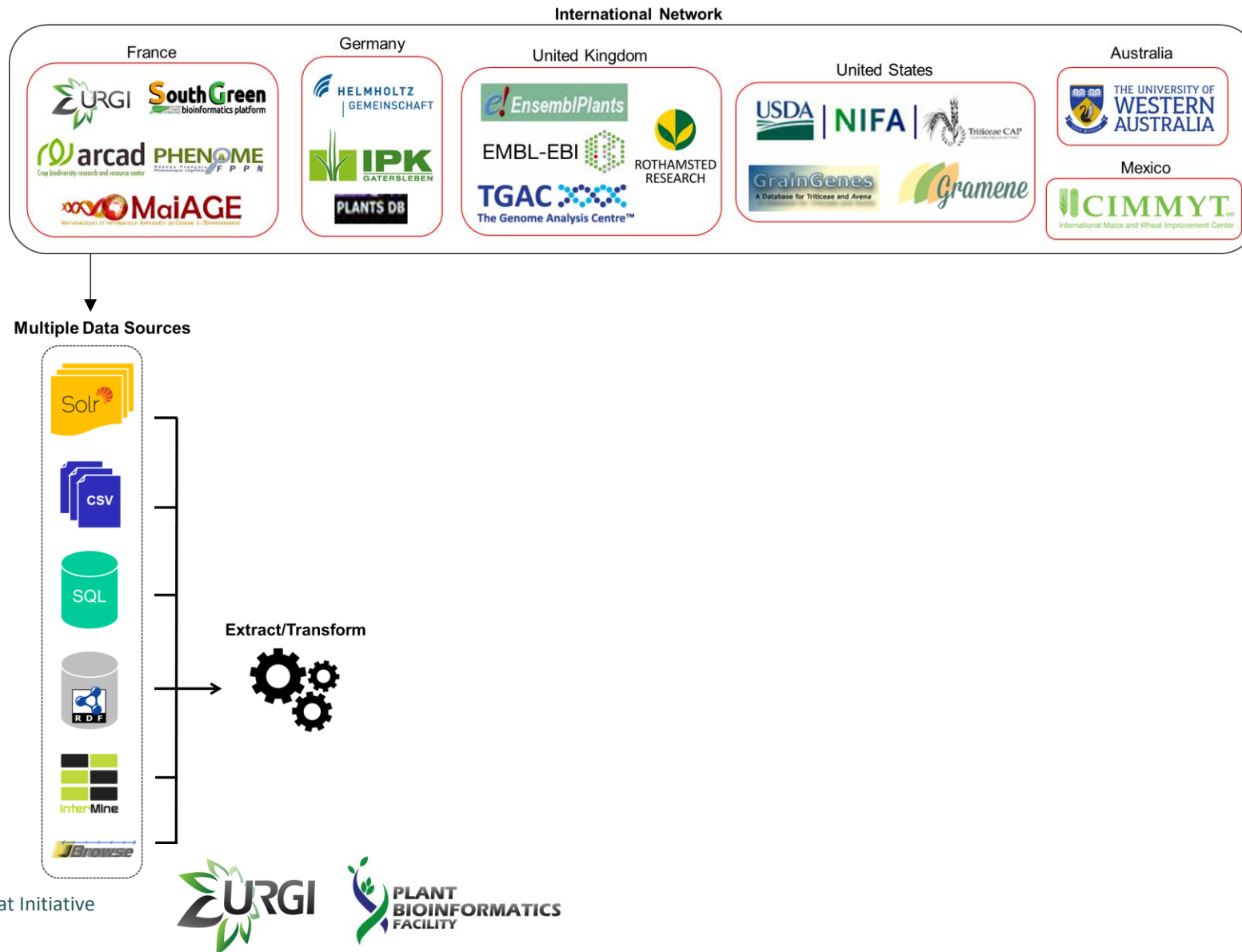
PlantPhenoDB [6]



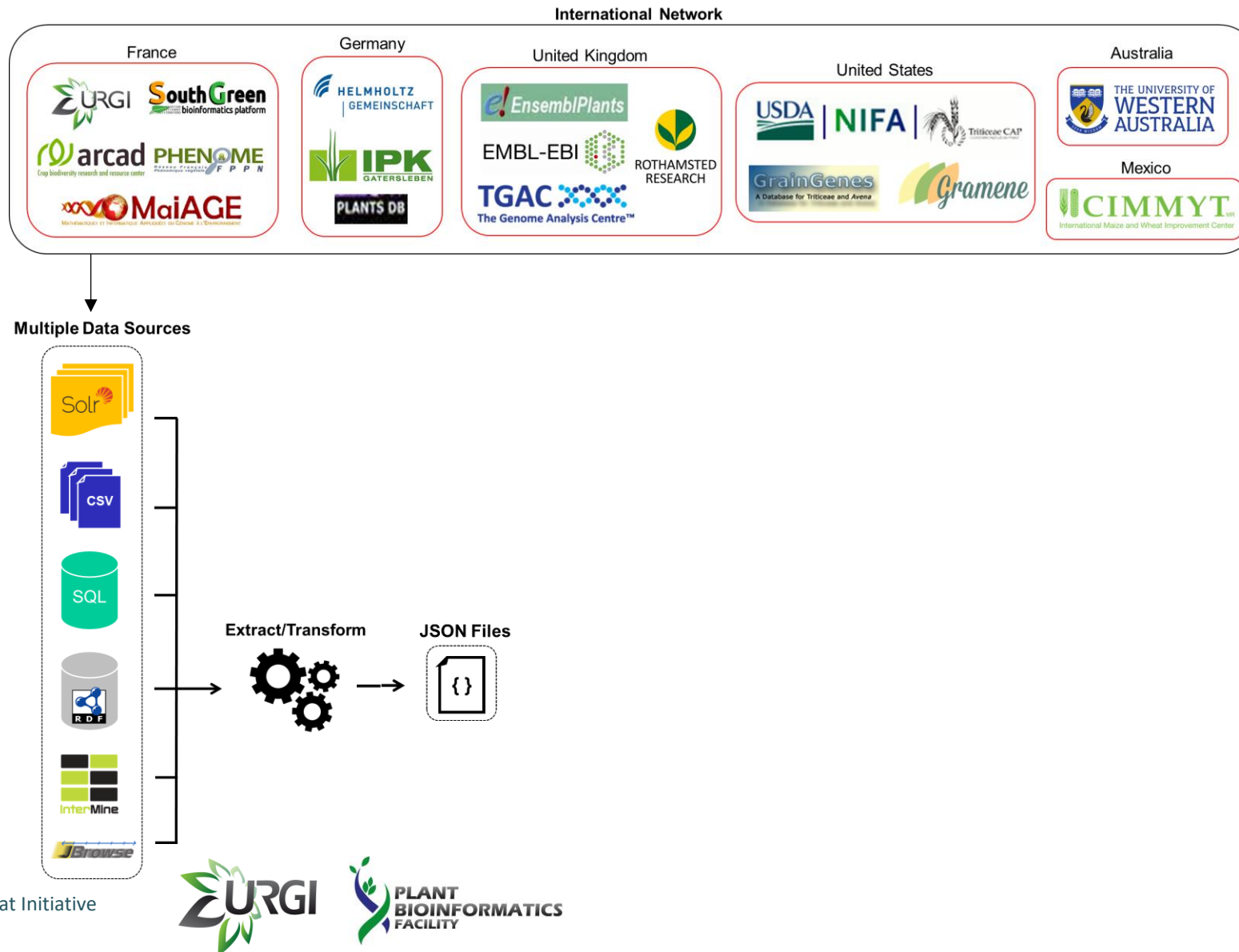
➤ Behind the scene



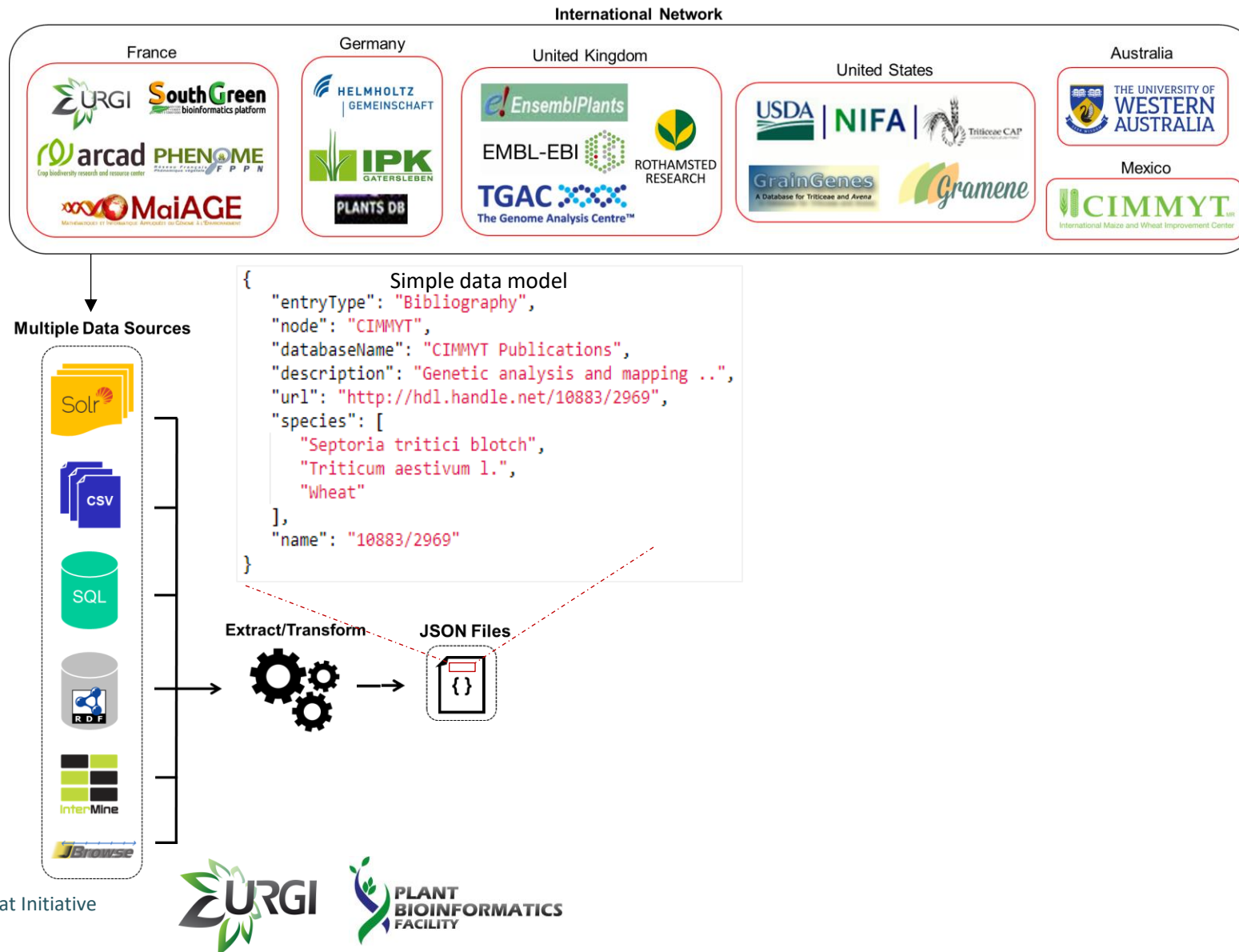
➤ Behind the scene



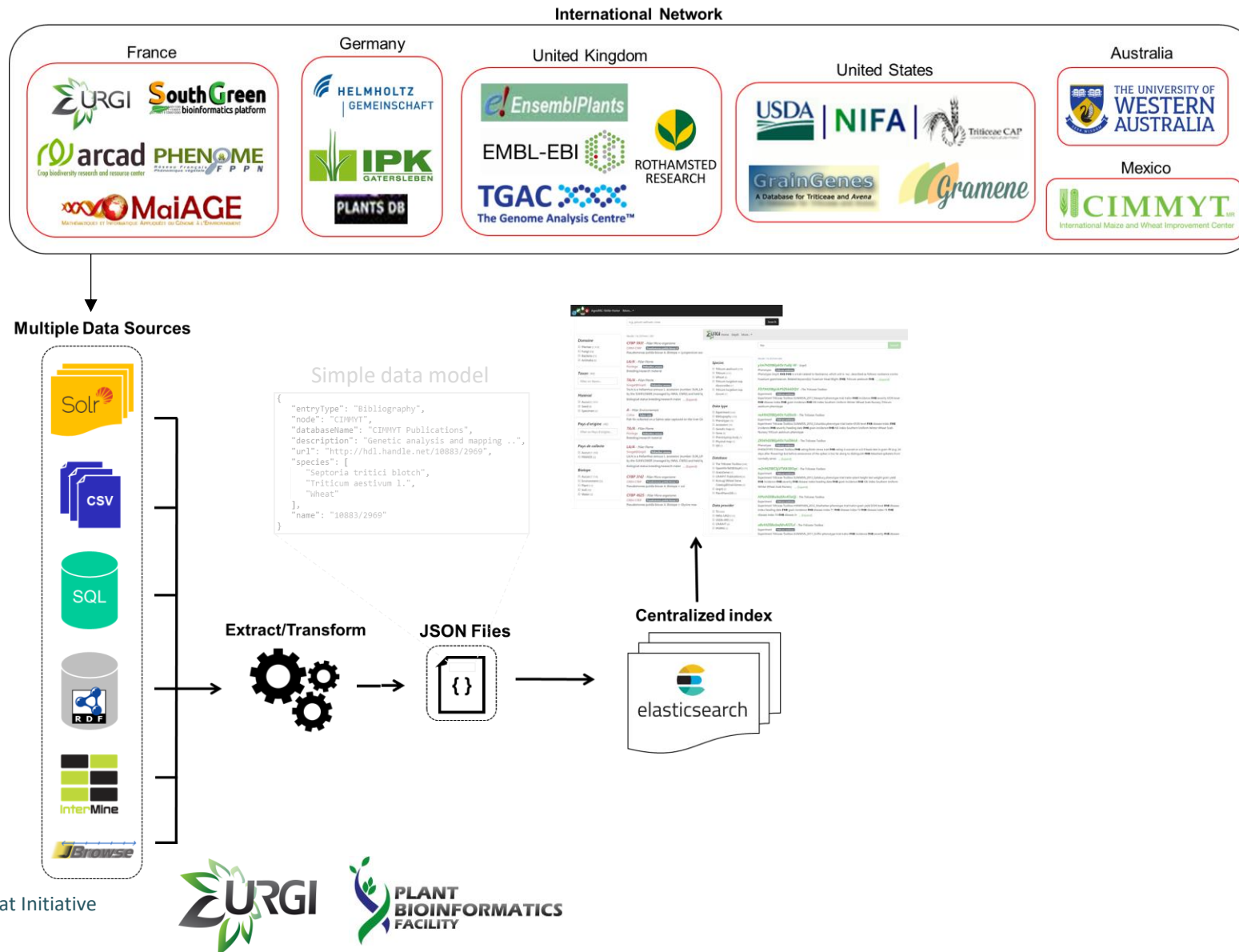
➤ Behind the scene



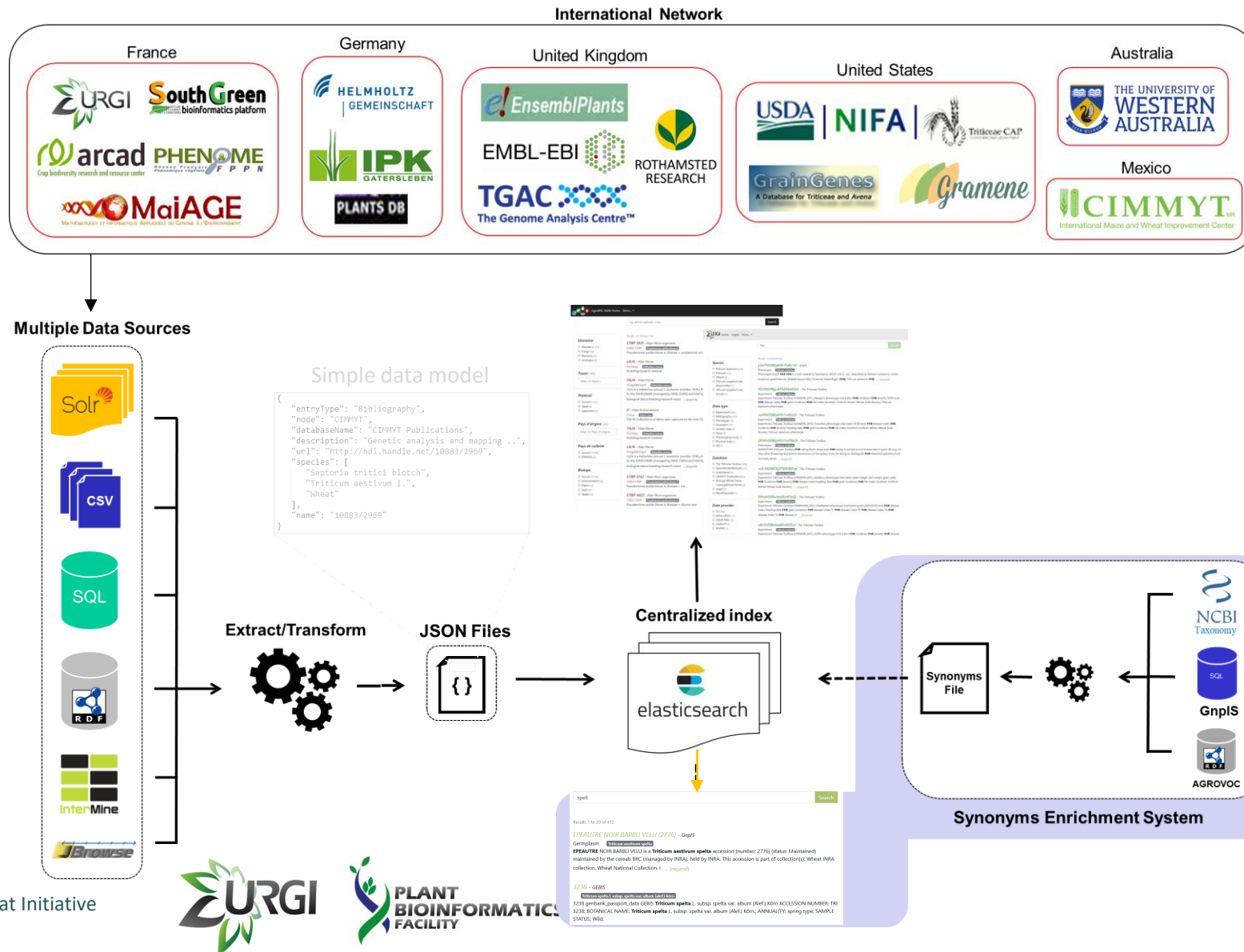
➤ Behind the scene



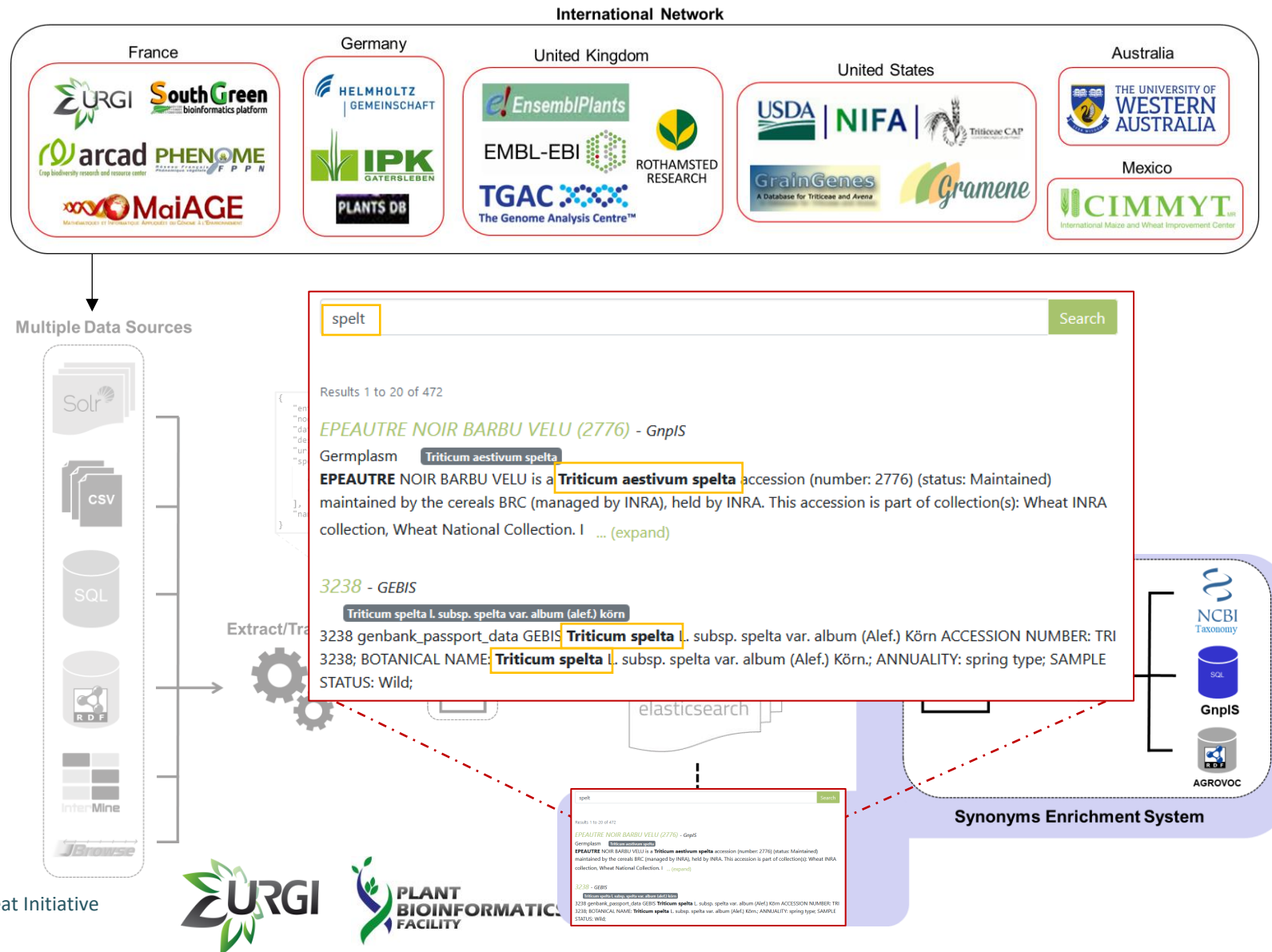
➤ Behind the scene



➤ Behind the scene



➤ Behind the scene



> Data exchange format



or


Field


- name
- url
- description
- entryType
- species
- node
- databaseName

Status

- mandatory
- mandatory
- mandatory
- mandatory
- mandatory
- mandatory
- mandatory

- 1
- 1
- 1
- 1
- 1-*
- 1
- 1

Constraints

- unique
- none
- none
- cf. list in doc, recom.
- cf. Species list below
- same for all a dataset
- none

- WheatIS species list: Aegilops*, Hordeum*, Triticum*, Wheat*
- Format: JSON or TSV, as you wish!
- Web server: HTTP or FTP, as you wish!
- The up-to-date format is always available at <https://urgi.versailles.inrae.fr/wheatis/join>



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> Demo



Home WheatIS website Wheat@URGI More...

WheatIS

Wheat Information
System



Data providers

INRAE-URGI

IWGSC@GnplS [19,195,264]
GnplS [642,142]
OpenMinTeD@GnplS [1,589]
WheatIS File Repository [6]

EBI

Ensembl Plants [1,168,762]

IPK

CR-EST [199,220]
GEBIS [51,302]
MetaCrop [355]

Gramene

Gramene [229,851]

T3

The Triticeae Toolbox [206,406]
UniProt by T3 [16,607]

UWA

Wheat Pangenome [167,167]

South Green

AgroLD [137,060]

Rothamsted Research

KnetMiner [108,474]

GrainGenes

GrainGenes [20,190]
Komugi wheat gene catalog by
GrainGenes [3,119]

PGSB

CrowsNest [13,324]

CIMMYT

CIMMYT Publications [1,605]
CIMMYT Datasets [183]

IPGPAS

PlantPhenoDB [6]

Examples: yield, fhb

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Intersection
(AND query)

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Species
☐ Triticum [1]

Data type
☒ Bibliography [1]

Database
☐ IWGSC@GnpIS [4]
☒ OpenMinTeD@GnpIS [1]

Data provider
☐ INRAE-URGI [1]

Results 1 to 1 from 1

[10.1007/s00122-012-1838-2](#) - OpenMinTeD@GnpIS

Bibliography **Triticum**

Bibliography OpenMinTeD 10.1007/s00122-012-1838-2 Mapping QTL for resistance to eyespot of <span class='openminted_taxon' [...] 415, and **cfd2** are tightly linked to Q.<span class='ope ... (Expand)

[JBIOWSE_chr4A_7333656_7333940_CFD_SSR_TRIMMED](#) - IWGSC@GnpIS

Gene annotation **Triticum aestivum**

SEQUENCE FEATURE IWGSC@GnpIS_chr4A_7333656_7333940_CFD_SSR_TRIMMED Start = 7333656 , End = 7333940 , Strand = 0 , Source = ePCR , Seq_id = chr4A , Size = 283 , Marker = **CFD2** , Id = **CFD2** , Type = similarity , Motif = ca(11) Triticum aestivum similarity chr4 ... (Expand)

[10.1007/s00122-012-1838-2](#) - OpenMinTeD@GnpIS

Bibliography **Triticum**

Bibliography OpenMinTeD 10.1007/s00122-012-1838-2 Mapping QTL for resistance to eyespot of <span class='openminted_taxon' [...] 415, and **cfd2** are tightly linked to Q.<span class='ope ... (Expand)

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Triticum aestivum (IWGSC)

Location: 2A:100,113,981-100,117,432
Gene: **TraesCS2A02G151900**
Trans: TraesCS2A02G151900.1

Gene-based displays

- Summary**
 - Splice variants
 - Transcript comparison
 - Gene alleles
- Sequence
 - Secondary Structure
- Gene families
- Literature
- Plant Compara
 - Genomic alignments
 - Gene tree
 - Gene gain/loss tree
 - Orthologues
 - Paralogues
 - Homoeologues
- Pan-taxonomic Compara
 - Gene Tree
 - Orthologues
- Ontologies
 - GO: Biological process
 - GO: Cellular component
 - GO: Molecular function
- Phenotypes
- Genetic Variation
 - Variant table
 - Variant image
 - Structural variants
- Gene expression
- Pathway
- Regulation
- External references
- Supporting evidence
- ID History
 - Gene history

Gene: TraesCS2A02G151900

Description Uncharacterized protein At3g57150 (Fragment) [Source:Projected from Arabidopsis thaliana (AT3G57150) UniProtKB/TrEMBL;Acc:C0SVF3]

Location [Chromosome 2A: 100,113,981-100,117,432](#) forward strand.

About this gene This gene has 1 transcript ([splice variant](#)) and [144 orthologues](#).

Transcripts [Show transcript table](#)

Summary

Gene type Protein coding

Annotation method Genes annotated with high confidence by IWGSC

[Go to Region in Detail](#) for more tracks and navigation options (e.g. zooming)

Gene Legend

Protein Coding
 IWGSC high confidence protein coding

Configuring the display

Tip: use the "Configure this page" link on the left to show additional data in this region.

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Species

☐ Triticum [1]

Results 1 to 1 from 1

10.1007/s00122-012-1838-2 - OpenMinTeD@GnpIS

Bibliography **Triticum**

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Original Paper | Published: 11 March 2012

Mapping QTL for resistance to eyespot of wheat in *Aegilops longissima*

Hongyan Sheng, Deven R. See & Timothy D. Murray 

Theoretical and Applied Genetics **125**, 355–366(2012) | [Cite this article](#)

402 Accesses | 14 Citations

Abstract

Eyespot is an economically important disease of wheat caused by the soilborne fungi *Oculimacula yallundae* and *O. acuformis*. These pathogens infect and colonize the stem base, which results in lodging of diseased plants and reduced grain yield. Disease resistant cultivars are the most desirable control method, but resistance genes are limited in the wheat gene pool. Some accessions of the wheat wild relative *Aegilops longissima* are resistant to eyespot, but nothing is known about the genetic control of resistance. A recombinant inbred line population was developed from the cross PI 542196 (R) × PI 330486 (S) to map the resistance genes and better understand resistance in *Ae. longissima*. A genetic linkage map of the S¹ genome was constructed with 169 wheat microsatellite markers covering 1261.3 cM in 7 groups. F₅ lines (189) were tested for reaction to *O. yallundae* and four QTL were detected in chromosomes 1S¹, 3S¹, 5S¹, and 7S¹. These QTL explained 44 % of the total phenotypic variation in reaction to eyespot based on GUS scores and 63 % for visual disease ratings. These results demonstrate that genetic control of *O. yallundae* resistance in *Ae. longissima* is polygenic. This is the first report of multiple QTL conferring resistance to eyespot in *Ae. longissima*. Markers *cfd6*, *umc507*, *umc415*, and *cfd2* are tightly linked to *O. yallundae* S¹.

CFD2 - IWGSC@GnpIS

Genome annotation **Triticum aestivum**

Genome annotation IWGSC@GnpIS **CFD2** **CFD2** is a similarity:ePCR_cfd of Triticum aestivum located between positions 14028 and 14311 on 4AS_v2_5981297 and which properties are Size=283,Motif=gt(9),load_id=CFD2_147 Triticum aestivum similarity

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[Abstract](#)

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> Demo

TRIUR3_07354 *Triticum urartu*

Putative deoxyribonuclease TATDN1

Location Homology X-refs

Model Species Homolog

Zm00001d007881 *Zea mays*

TatD related DNase

Search Login

Speci

☐ Hor

☐ vulc

☐ Tritic

☐ Tritic

☐ Bra

☐ dist

☐ Aeg

Data

☐ Inte

☐ Ger

☐ Go

☐ Inte

☐ Inte

☐ Go

☐ Inte

Data

☐ Gra

TRIUR3_07354

Search for genes, species, pathways, ontology terms, domains...

Gene | TRIUR3_07354

1 genes in 1 genomes

TRIUR3_07354

Et_s6749-0.26-1.path1

Panicoideae: 3 genes

SORBL3002G038200

Zm00001d007881

Zea mays: 4 genes

Poaceae: 29 genes

GSMUA_Achr8G03040_001

Dr11125

Pentapetalae: 34 genes

AMTR_s00004p00176820

Selaginella moellendorffii: 2 genes

Embryophyta: 3 genes

Chlorophyta: 2 genes

Eukaryota: 7 genes

Search Gramene

Show All Homologs 91

Show Orthologs 89

Links to other resources

Ensembl Gene Tree view

Release Notes (62) About Cite Feedback Privacy

Gramene is a collaborative effort among Cold Spring Harbor Laboratory, Oregon State University, and EMBL-EBI.

Funding is provided by the NSF and USDA ARS.

Application Info

- Data Release 62
- Gramene Search UI LOCAL DEVELOPMENT BUILD
- Built on January 14th 2020 at 1:01:57 pm

Actions

Reset Gramene Search

➤ New features: ontology annotation

- Link literature with experimental data (genotyping, phenotyping...) using ontology annotation
- Corpus of ~1600 wheat open access publications
- Text mining ontology: Wheat Trait Ontology
<http://wheat.agroportal.lirmm.fr/ontologies/WHEATPHENOTYPE>
- Semantic facet filtering



➤ New features: synonym enrichment

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Species (290)

Data type (20)

Database (17)

Data provider
☐ UWA [167 167]
☐ INRAE-URGI [12 224]
☐ GrainGenes [8 008]
☐ IPK [6 706]
☐ CIMMYT [1 696]
☐ T3 [1 353]
☐ Rothamsted Research [63]
☐ Gramene [4]
☐ IPGPAS [1]

Results 1 to 20 from 197 222 (limited to 10 000)

Marquis*4/2/Stewart*3/Triticum monococcum - GrainGenes

Germplasm **Triticum aestivum**

Germplasm GrainGenes Marquis*4/2/Stewart*3/**Triticum monococcum** Unknown Germplasm Type. Marquis*4/2/Stewart*3/**Triticum monococcum** Triticum aestivum ... (Expand)

2006380 - GEBIS

Triticum monococcum L

2006380 genbank_passport_data GEBIS **Triticum monococcum** L. ACCESSION NUMBER: TRI 29537; BOTANICAL NAME: **Triticum monococcum** L.; OTHER NAMES: Albini; ANNUALITY: spring type; SAMPLE STATUS: Advanced/improved cultivar; COUNTRY OF ORIGIN: Germany; ... (Expand)

617 - GEBIS

Triticum monococcum L. var. vulgare korn

617 genbank_passport_data GEBIS **Triticum monococcum** L. var. vulgare Korn ACCESSION NUMBER: TRI 617; BOTANICAL NAME: **Triticum monococcum** L. var. vulgare Korn.; ANNUALITY: spring type; SAMPLE STATUS: Traditional cultivar/landrace; COUNTRY OF ORIGIN: Albania; ... (Expand)

2009 - GEBIS

Triticum monococcum L. var. macedonicum papag

2009 genbank_passport_data GEBIS **Triticum monococcum** L. var. macedonicum Papag ACCESSION NUMBER: TRI 2009; BOTANICAL NAME: **Triticum monococcum** L. var. macedonicum Papag.; ANNUALITY: spring type; SAMPLE STATUS: Traditional cultivar/landrace; COUNTRY OF ORIGIN: ... (Expand)

644 - GEBIS

Triticum monococcum L. var. vulgare korn

644 genbank_passport_data GEBIS **Triticum monococcum** L. var. vulgare Korn ACCESSION NUMBER: TRI 644; BOTANICAL NAME: **Triticum monococcum** L. var. vulgare Korn.; ANNUALITY: spring type; SAMPLE STATUS: Traditional

➤ New features: BrAPI sources

The screenshot displays the WheatIS DataDiscovery web interface. At the top, there are logos for 'wheatIS' and 'WHEAT INITIATIVE', along with navigation links: 'Home', 'Wheat@URGI', and 'More...'. The main heading is 'WheatIS DataDiscovery' next to a wheat field image. Below this is a search bar with the text 'Examples: yield, fhb' and a 'Search' button. A list of 'Data providers' is shown on the left, categorized by institution. Red arrows point from the text 'BrAPI data sources' to three specific entries: 'brapi@INRAE-URGI' under INRAE-URGI, 'brapi@EVA' under EVA, and 'brapi@TERRA-REF' under TERRA-REF.

Data providers

- INRAE-URGI**
 - IWGSC@GnplS [19,195,264]
 - GnplS [631,498]
 - brapi@INRAE-URGI [15,949]
 - OpenMinTeD@GnplS [1,692]
 - WheatIS File Repository [6]
- EBI**
 - Ensembl Plants [3,071,189]
- IPK**
 - CR-EST [199,220]
 - GEBIS [51,820]
 - MetaCrop [355]
- Gramene**
 - Gramene [229,851]
- T3**
 - The Triticeae Toolbox [206,406]
 - UniProt by T3 [16,607]
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 - CIMMYT Datasets [183]
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- TERRA-REF**
 - brapi@TERRA-REF [284]
- IPGPAS**
 - PlantPhenoDB [6]

BrAPI data sources

> How to join ?

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How to join the wheat data?

If you want your information system to be referenced, you should [contact us](#) as soon as possible so that we can process your data or [JSON](#) files with metadata only. The metadata format must follow the indications below and we invite you to [contact us](#) as soon as possible so that we can process your data the best way to go ahead.

Note that since the tool makes a backlink to your information system, we need a URL allowing researchers to get detailed information about the indexed entry directly in your information system.

Overview of the metadata associated to each searchable entry/document

- a short [name](#) identifying uniquely the entry, ie. [BTH_Le_Moulon_2000_SetA](#)
- an [url](#) linking back to the entry in your own web application, ie. <https://urgi.versailles.inrae.fr/ephephesis/ephephesis/viewer.do#trialCard/trialId=56>
- a [description](#), of the entry that contains all the relevant keywords allowing to find your entry. All the terms of this field are used by the search tool to allow users to find entries
- an [entryType](#) describing the type of the entry, that could be any of the terms listed in the dedicated section below
- a [species](#) field, containing the species related to the entry (zero, one or several, but it is highly recommended to provide at least one)
- a [node](#), the name of your laboratory/institute, it should be the same for all the entities you manage
- a [databaseName](#), the name of the database from which the entry has been extracted. It can differ from one entry to another if you handle several databases

Detailed specifications for the metadata fields

name

I

The value of the [name](#) field must be unique in your own dataset and should be clear enough to help scientists to identify at the first glance this entry among the other.

Status	Cardinality	Constraints
Mandatory	1	Unique



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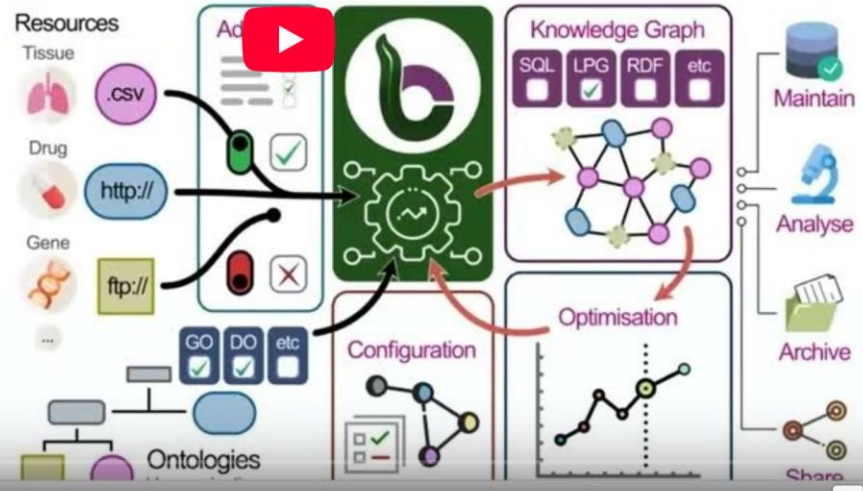
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27/11/2024



➤ Experiences about AI in wheat bioinformatics

➤ BioCypher
A unifying framework for biomedical KGs

- Relies on a collection of **reusable “adapters”** for the different sources of biomedical knowledge
- **Recombination** of those adapters to fit various demands
- Reducing redundant maintenance work through **quasi-standardisation**
- Integrates the controlled vocabularies of ontologies into the process helps to harmonise the data from individual resources and yields a consistent semantic basis for downstream analyses.
- Through unambiguous and simple “low-code” configuration, a reproducible knowledge graph can be created and shared for every specific task



The diagram illustrates the BioCypher architecture. On the left, 'Resources' (Tissue, Drug, Gene) and 'Ontologies' (GO, DO, etc) are shown. Arrows point from these to a central 'Configuration' box, which contains a 'b' logo and a gear icon. From the 'Configuration' box, arrows point to a 'Knowledge Graph' box (containing SQL, LPG, RDF, etc) and an 'Optimisation' box (containing a line graph). On the right, a vertical stack of boxes labeled 'Maintain', 'Analyse', 'Archive', and 'Share' is shown, with arrows pointing from the 'Knowledge Graph' and 'Optimisation' boxes to them.

WheatIS EWG half-yearly meeting AI



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