Genomic, genetic and phenomic plant data at the INRA URGI : GnpIS.

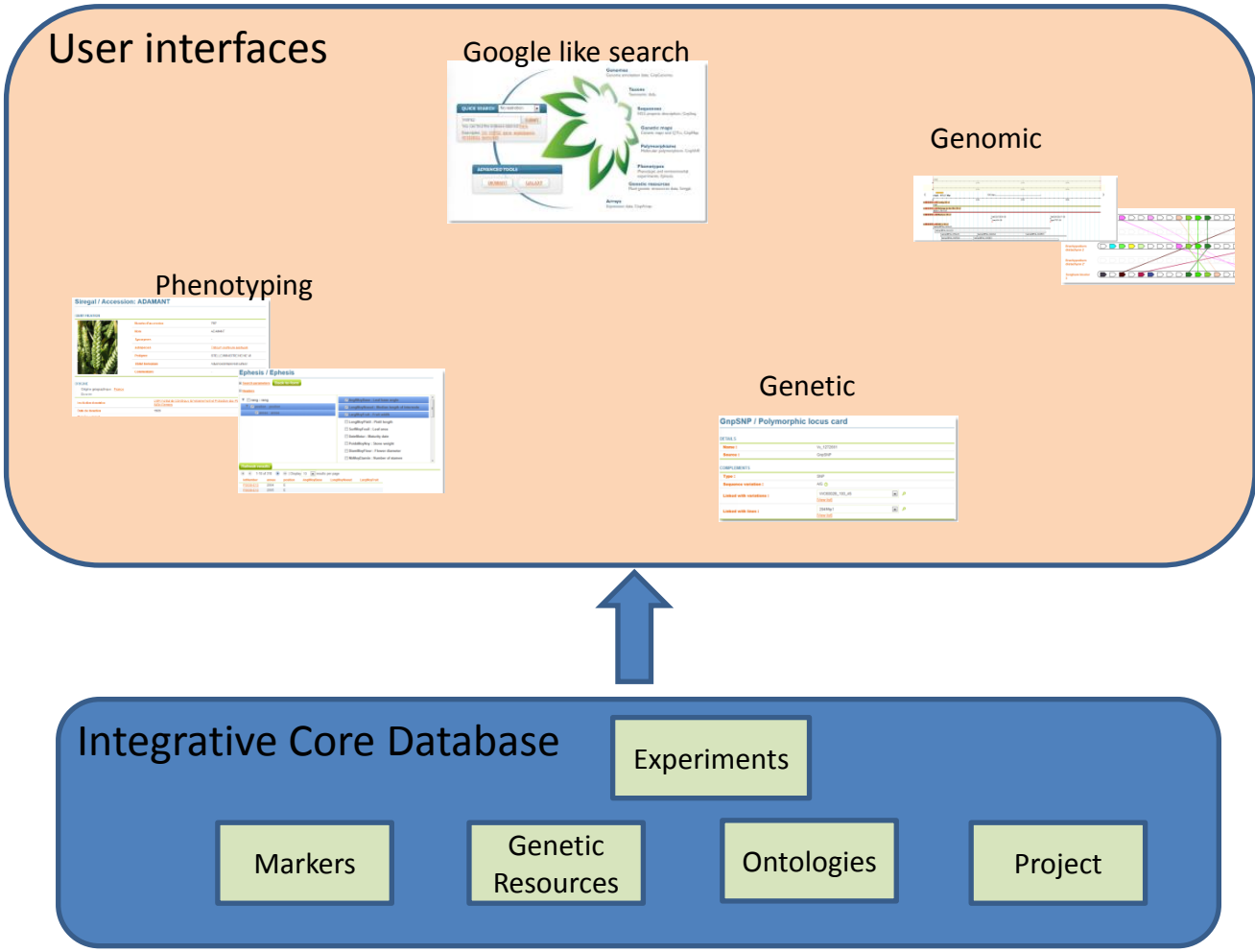
Training on Triticeae

- GnpIS presentation
- Part I, Wheat Genomic resources
  - **Quick tour of private sections**
- Part II, Genetic resources and Phenotyping
- Part 3 : Data set building with Biomarts

GNPIS PRESENTATION

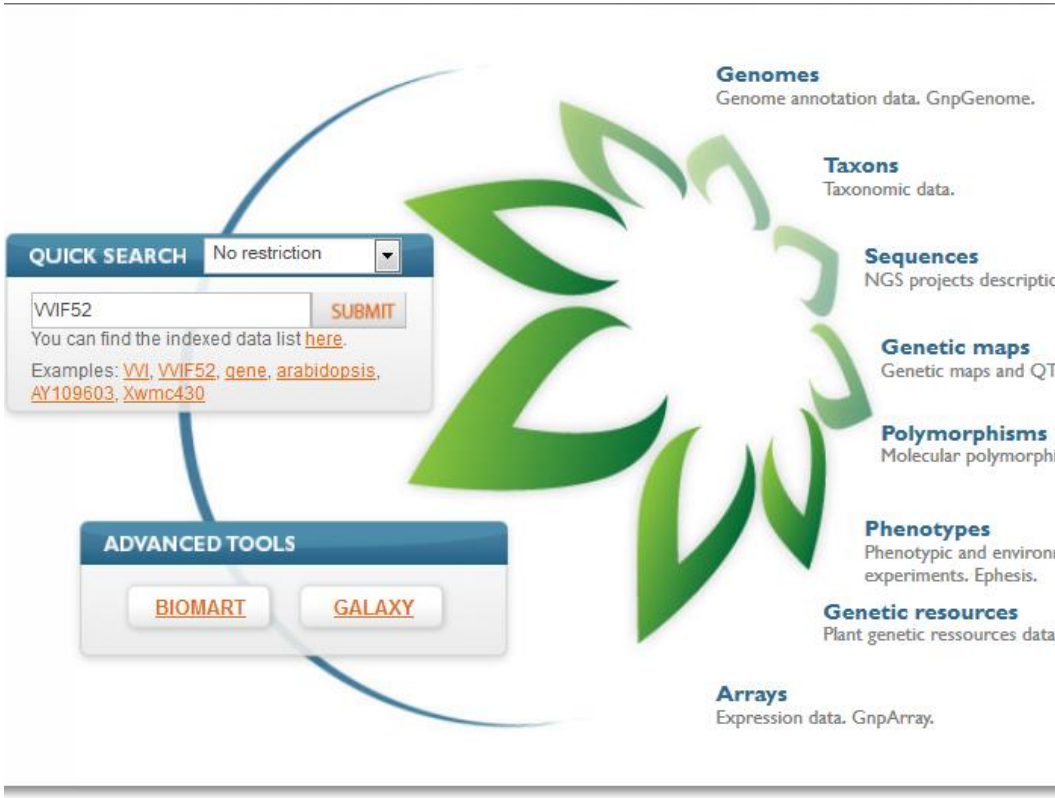
GnpIS, URGI's Information system

- Information system
  - Integrative
  - Multi thematic
    - Genetic
    - Genomic
    - Phenotyping
  - Multispecies

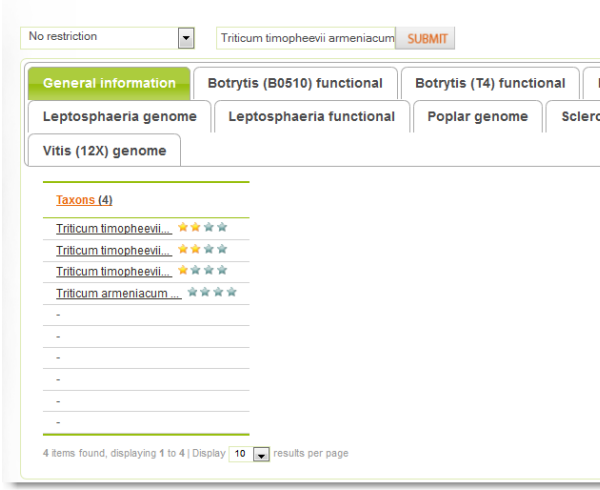


User interfaces

- Query, navigate, export data
  - **Integrative/transversal tools**
  - **Thematic tools.**



User interfaces
Integrative and transversal tool



- Quick search interface
  - URGI development
    - Apache Lucene : full text search
  - Google like search on GnpIS
  - Entry point for thematic tools
  - Wheat portal http://wheat-urgi.versailles.inra.fr/

- Advanced search : Biomart
  - Datamart
    - Aggregation/Computation of GnpIS core database
    - Designed for a specific questioning : fact with attributes with dimension for filtering.
  - Multicriterion based dataset building
  - Available data marts
    - Genetic maps (markers, Qtls), Polymorphisms (snps, genes), Genetic and Phenotype resources with Genes annotations
    - Grapevine stuctural and functional annotation with Genetic maps (genetic markers)
    - Wheat, stuctural annotation with Genetic maps (genetic markers..) and Polymorphisms (snps)
    - Genes functional annotation
      - Arabidopsis Thaliana TAIRV10, Zea mays ZmB73, Populus trichocarpa, Botrytis cinerea T4, Botrytis cinerea B0510, Sclerotinia sclerotiorum, Leptosphaeria maculans
- Advanced Search and pipeline: Galaxy

Dedicated thematic interfaces
Genetic

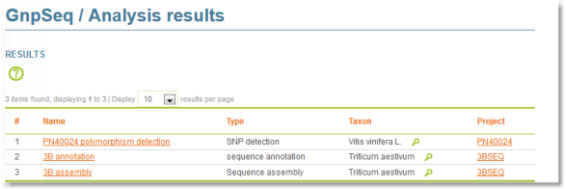
- Gene expression
- Genetic maps, markers and QTLs
  - **MetaQTL**
- Sequence
  - **DNA Polymorphisms**
  - **Genotyping**
  - **NGS Sequence**
- Phenotyping
  - **Genetic ressources, passports**
    - **Primary phenotypes**
  - **Phenotyping experiment (G*E)**

METAQTL DETAILS

MetaQTL	MQTL2A2
Meta-analysis	MQTL_CxQxT_2A2
Number of MetaQTL(s)	1
Taxon	Triticum aestivum
Meta-trait	Seed quality

QTL DETAILS

QTL	MetaQTL belonging	Trait
cf.8.HN_GPC_2A2_23.8	1.0	GPC
cf.8.HN_GY_2A2_34.4	1.0	GY



GnpSeq / Analysis results

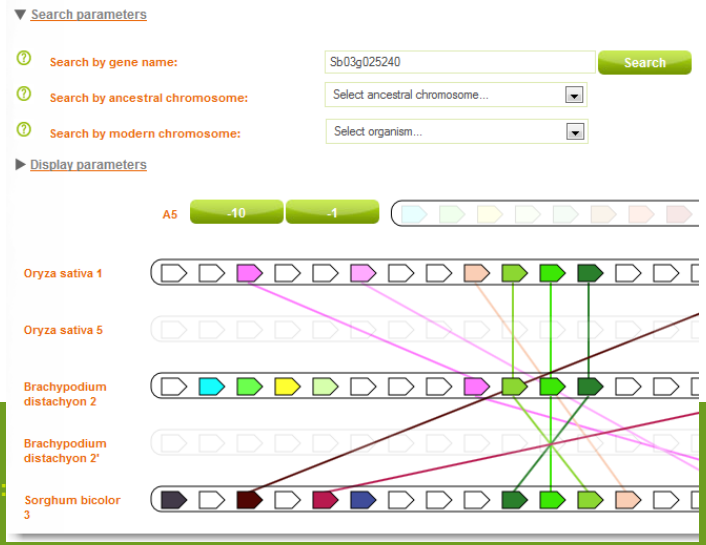
RESULTS

3 items found, displaying 1 to 3 | Display 10 results per page

#	Name	Type	Taxon	Project
1	PN40024 polymorphism detection	SNP detection	Vitis vinifera L.	PN40024
2	3B annotation	sequence annotation	Triticum aestivum	3BSEQ
3	3B assembly	Sequence assembly	Triticum aestivum	3BSEQ

Dedicated thematic interfaces
Genomic

- Gbrowse
  - Genome with annotations (partners, consortium, public)
  - Markers, SNP (URGI)
    - SNP Clustering and mapping via MapHits (URGI)
  - Transposable elements (URGI)
- Sequence Retrieval System (SRS) or Mobyle
  - Blast or Blat against URGI databanks.
- Genome Report System (GRS)
  - Gene annotation integration interface.
- Synteny viewer (URGI, GDEC J. Salse)



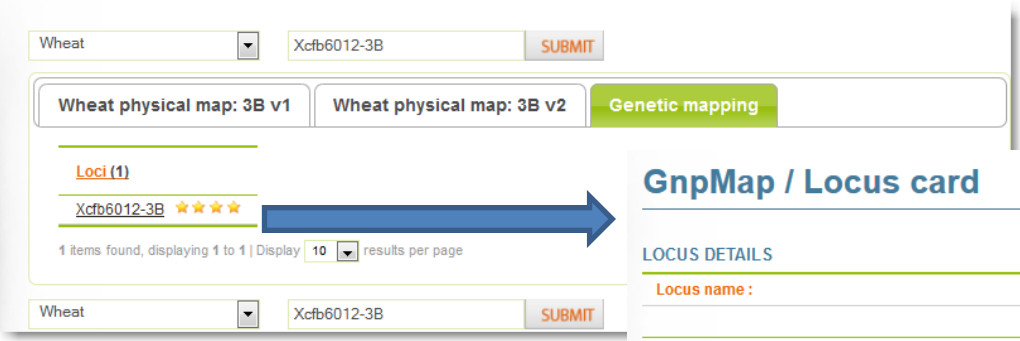
WHEAT GENOMIC RESOURCES

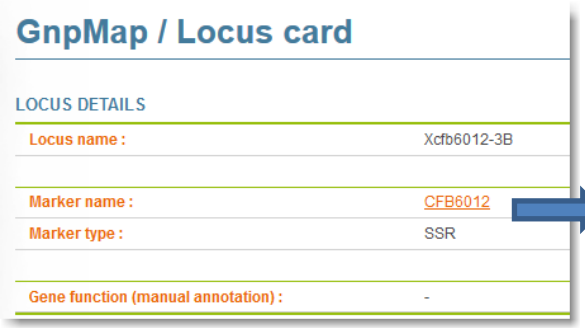
Exercise 1.1

- Entry point http://wheat-urgi.versailles.inra.fr
- I want all information on loci Xcfb6012-3B
  - **Any marker ? If yes :**
    - **Type, name**
    - **What are the positions on the Genetic Maps ?**

Exercise 1.1, solution

- Loci Xcfb6012-3B



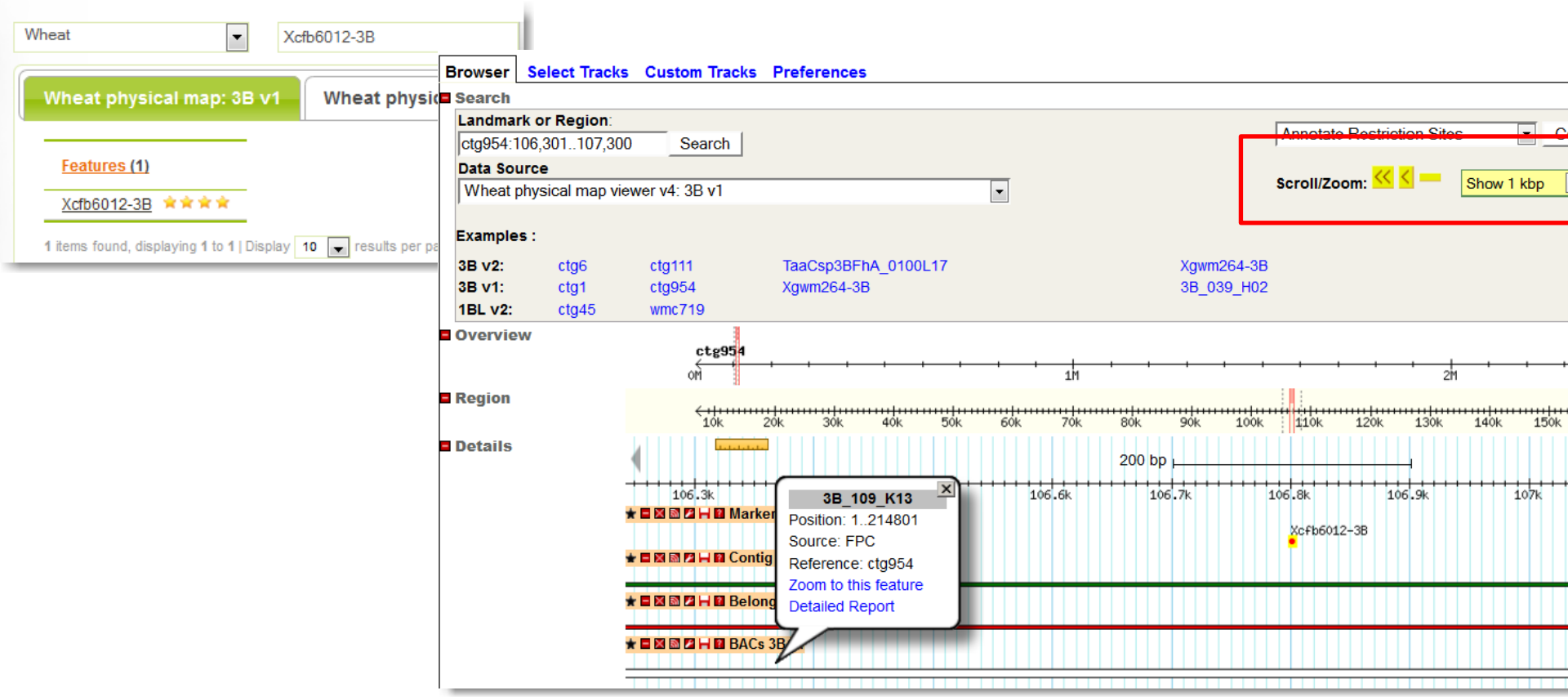


Exercise 1.2

- Display loci Xcfb6012-3B ‘s region on 3B V1 physical Map
- Is Xcfb6012-3B ‘s located on any physical BAC, is there any nearby annotation ?
  - **Find Xcfb6012-3B contigs and deletion bin**
  - **Identify the First physical BAC**
  - **On Annotation Browser (Wheat annotation viewer v2), find one mRNA colocalised with this physical BAC and display the sequence**
  - **What QTL is colocalised on this BAC. What is the associated Trait ?**

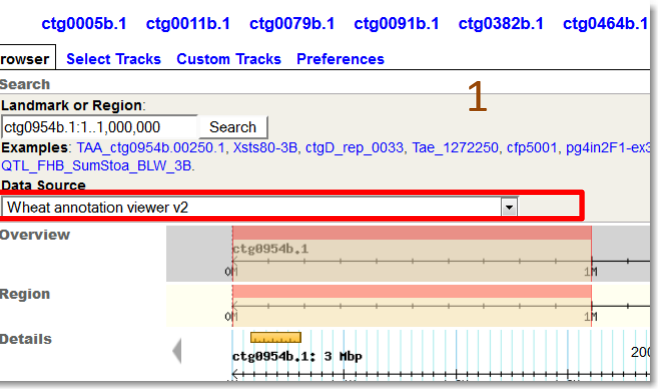
Exercise 1.2, solution

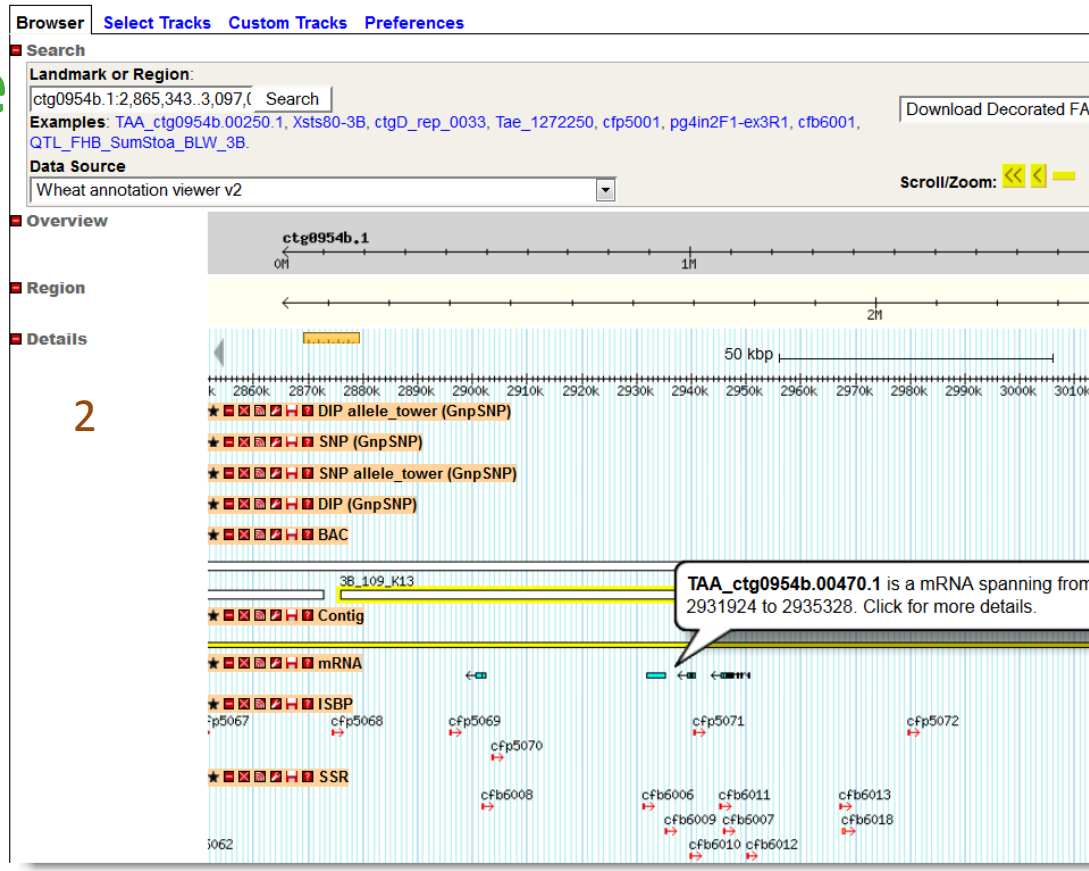
- Display loci Xcfb6012-3B ‘s region on 3B V1 physical Map
- Is Xcfb6012-3B ‘s located on any physical BAC ?



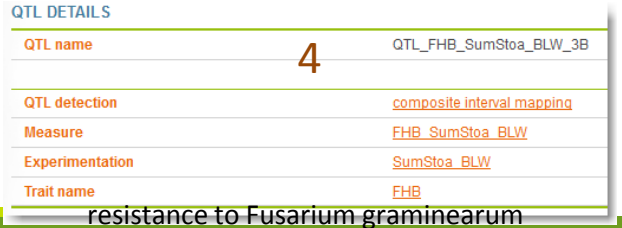
Exe

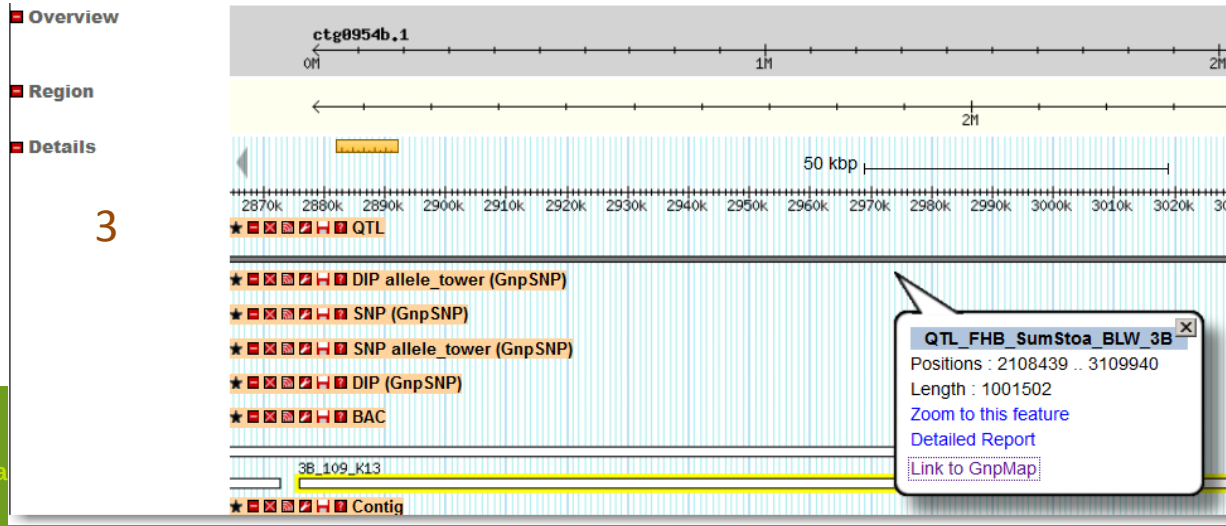
- Is Xcfb6012-3B ‘s located on any physical BAC, is there any nearby annotation ?
- Copy / paste 3B_109_K13 in Landmark





- Note SSR CFB6012 previously colocalised with Xcfb6012-3B

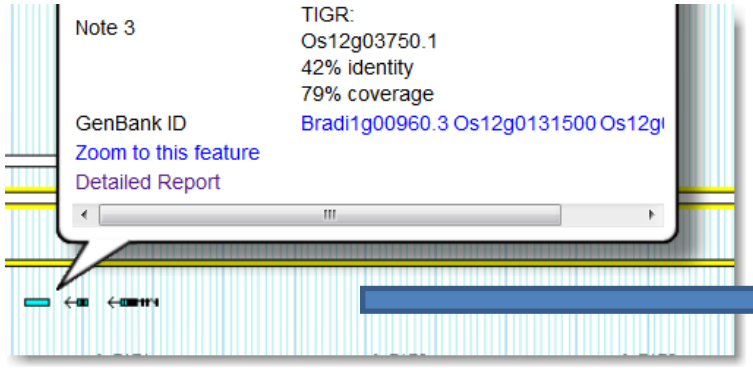


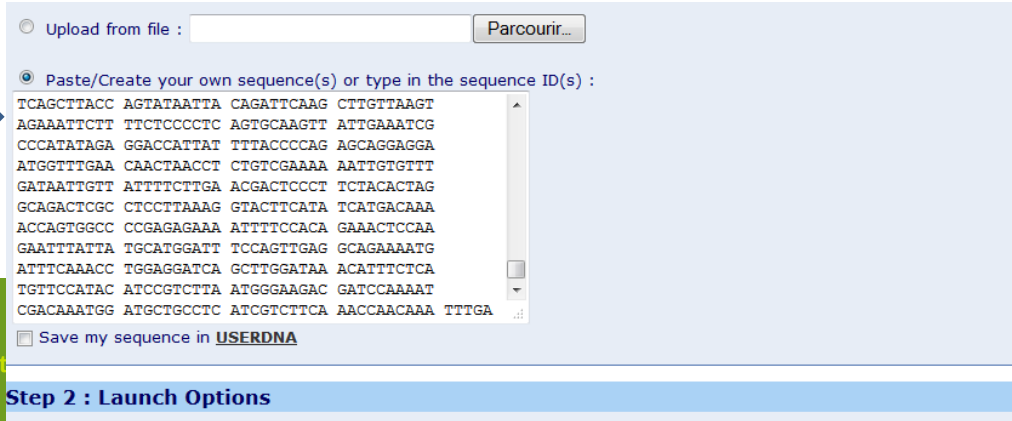


resistance to Fusarium graminearum

Private

- Consortium private area
- Free registration from wheat web site
  - **http://wheat-urgi.versailles.inra.fr/Register**
- Blast : SRS
- A quick tour
  - **Sytneny viewer**
  - **Wheat dedicated portal**





PART II, GENETIC RESOURCES AND PHENOTYPING

Exercise 2.1

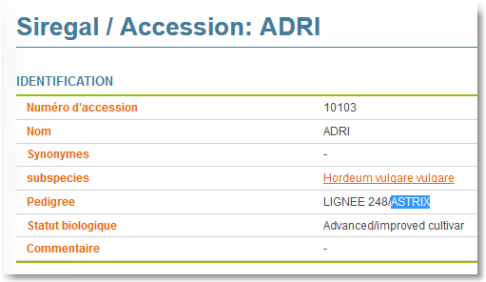
- Important : be careful not to accidently order semences on Siregal interfaces.
- I want to study Hordeum vulgare.
  - **What are the available resources on Hordeum genus?**
  - **What are the available subspecies (Siregal thematic interface recommended)**

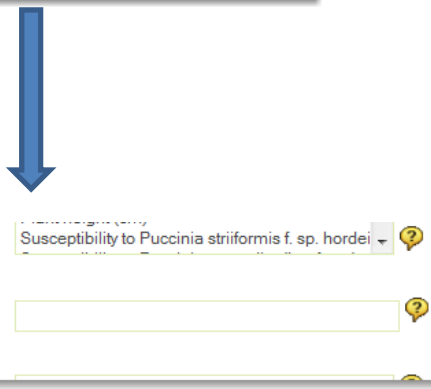
Exercise 2,1, solution

Exercise 2.2

- Is there any winter cultivar for Hordeum vulgare vulgare ?
  - **What is Adri cultivar pedigre/genealogy ?**
  - **What are the Accessions related to Astrix ?**

Exercise 2.2, solution





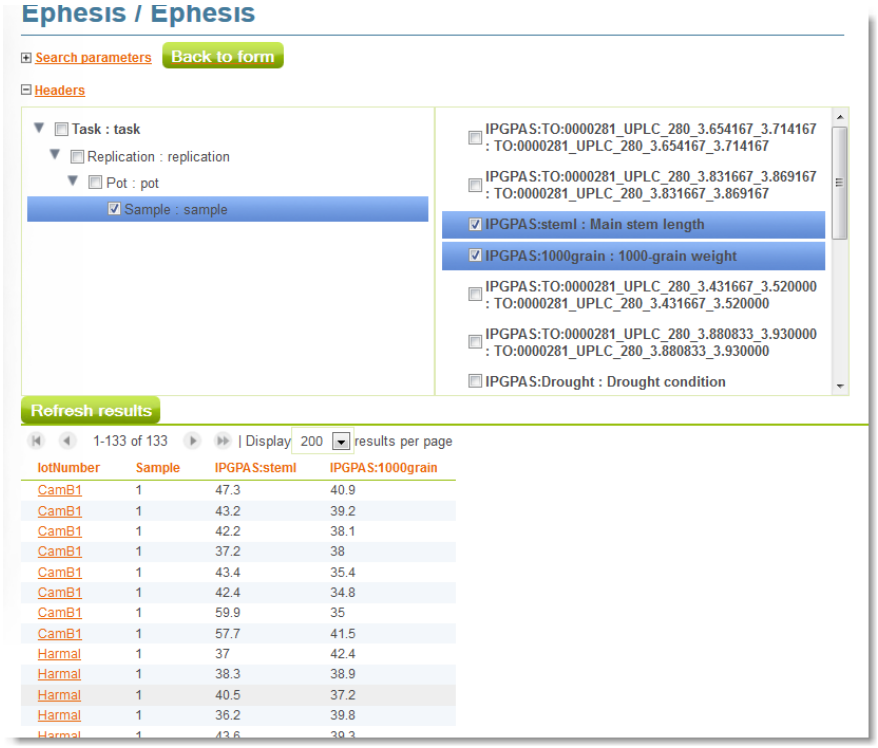
4 items found, displaying 1 to 4 | Display 10 results per page

#	Accession number	Accession name	Taxon	Biological status	Country	Basket
1	10103	ADRI	Hordeum vulgare vulgare	Advanced/improved cultivar	FRA	+
2	9334	ELAN~DESPREZ	Hordeum vulgare vulgare	Advanced/improved cultivar	FRA	+
3	9476	MONIX	Hordeum vulgare vulgare	Advanced/improved cultivar	FRA	+
4	10096	TEAM	Hordeum vulgare vulgare	Advanced/improved cultivar	FRA	+

Exercise 2.3

- Find Hordeum related experimental data.
  - **Ephesis thematic interface recomended**
- Export sample ID, steml and 1000grain data for Harmal and CamB1

Exercise 2.3 solution



lotNumber	Sample	IPGPAS:steml	IPGPAS:1000grain
CamB1	1	47.3	40.9
CamB1	1	43.2	39.2
CamB1	1	42.2	38.1
CamB1	1	37.2	38
CamB1	1	43.4	35.4
CamB1	1	42.4	34.8
CamB1	1	59.9	35
CamB1	1	57.7	41.5
Harmal	1	37	42.4
Harmal	1	38.3	38.9
Harmal	1	40.5	37.2
Harmal	1	36.2	39.8

PART 3 : DATA SET BUILDING WITH BIOMARTS

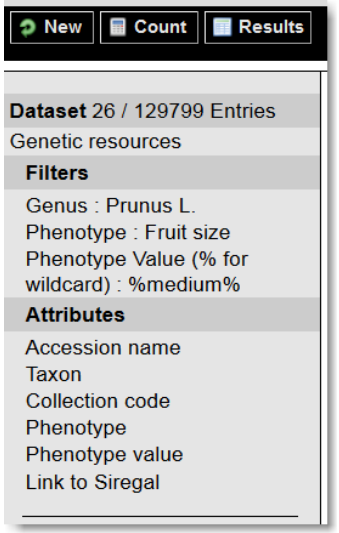
Exercise 3.1

- Siregal thematic interface limitation
  - **Growth class annotated data filter only.**
  - **To add value filter**
    - **Biomart now**
    - **Planned devlopment for siregal thematic interface**

- Go to Biomart
  - **http://urgi.versailles.inra.fr/biomart/martview/300678dcd6dcb13b10e1dc6b318d6a84**
  - **Choose genetic resources dataset**
- I want all Spring accession of genus triticum
  - **Growth class = %Spring%**

Exercise 3.3

- Genetic resources dataset Phenotypes are Primary phenotypes
  - **Constant for all individuals**
  - **Assumed more or less independant from the environment**
  - **Fruit size, fruit color, Mean LAI, etc…**
- I want to study the variability of Primary phenotypes in experiments.
  - **Prunus has a lot of public data**
  - **Exercise 3.2: I want all prunus with medium fruit size.**
  - **Exercise 3.3: Get all experiment data**



Exercise 3.3 solution

New | Count | Results | URL

ataset 26 / 129799 Entries
enetic resources
Filters
Genus : Prunus L.
Phenotype : Fruit size
Phenotype Value (% for wildcard) : %medium%
Attributes
Accession name
Taxon
Collection code
Phenotype
Phenotype value
Link to Siregal

ataset 1101 / 20584 Entries
henotype ressources
Filters
Taxons : Prunus domestica L.,Prunus insititia L.
Phenotype Name : Fruit cracking percentage,Fruit flesh color, L* value,Fruit flesh color, a* value,Fruit flesh color, b* value,Fruit height,Fruit weight,Fruit width
Attributes
Phenotype
Phenotype value
Scientific name

Export all results to File XLS Unique results only Go

Email notification to

View 150 rows as HTML Unique results only

Accession name	Taxon	Collection code	Phenotype	Phenotype value	Link to Siregal	Phenotype	Phenotype value
Madame Guttin	Prunus domestica L.	PLUM_NATIONAL_COLLECTION	Fruit size	medium | moyen	13891	Fruit flesh color, L* value	
Madame Guttin	Prunus domestica L.	PLUM_NATIONAL_COLLECTION	Fruit size	medium | moyen	13891	Fruit width	
Quetsche verte	Prunus domestica L.	PLUM_NATIONAL_COLLECTION	Fruit size	medium | moyen	13944	Fruit weight	
Quetsche verte	Prunus domestica L.	PLUM_NATIONAL_COLLECTION	Fruit size	medium | moyen	13944	Fruit width	33.9915
Ovale jaune	Prunus domestica L.	PLUM_NATIONAL_COLLECTION	Fruit size	medium | moyen	13947	Fruit flesh color, b* value	
Ovale jaune	Prunus domestica L.	PLUM_NATIONAL_COLLECTION	Fruit size	medium | moyen	13947	Fruit cracking percentage	0.05
Ovale jaune	Prunus domestica L.	PLUM_NATIONAL_COLLECTION	Fruit size	medium | moyen	13947	Fruit flesh color, a* value	6.5137315
Verdanne	Prunus domestica L.	PLUM_NATIONAL_COLLECTION	Fruit size	medium | moyen	13905	Fruit weight	34.425
Verdanne	Prunus domestica L.	PLUM_NATIONAL_COLLECTION	Fruit size	medium | moyen	13905	Fruit weight	
Verdanne	Prunus domestica L.	PLUM_NATIONAL_COLLECTION	Fruit size	medium | moyen	13905	Fruit weight	25.975
Verdanne	Prunus domestica L.	PLUM_NATIONAL_COLLECTION	Fruit size	medium | moyen	13905	Fruit flesh color, b* value	
Verdanne	Prunus domestica L.	PLUM_NATIONAL_COLLECTION	Fruit size	medium | moyen	13905	Fruit height	40.082
Verdanne	Prunus domestica L.	PLUM_NATIONAL_COLLECTION	Fruit size	medium | moyen	13905	Fruit cracking percentage	0
Berudge	Prunus domestica L.	PLUM_NATIONAL_COLLECTION	Fruit size	medium | moyen	13917	Fruit weight	28.818182
Reine-Claude Davion	Prunus domestica L.	PLUM_NATIONAL_COLLECTION	Fruit size	medium | moyen	13895	Fruit weight	23.3

GnpIS Perspectives

- Data
  - 8 years of Triticea French phenotyping experiments (novembre)
  - Private data for national projects.
  - Wheat for all thematics
- Development
  - Improved searching capabilities
    - Project driven (10 national projects)
    - Thematic
    - Transversal entry point
  - Association genetic
  - Integration with Distributed search systems : Transplant.
  - Integration with Phenome, Ephesis as an integrative portal for FPPN.