



# European small berries genetic resources GENRES036 (GENBERRY)



# Previous European Actions on small fruits (strawberry)

## 1990s AIR-EC concerted Action

- European Strawberry Variety Network
- European Old Variety Repository

## COST Action 836 “Integrated berry production” 1998 – 2003

Towards an Organisation of the Integrated Research in Berries: Model for a Strawberry of Quality, in Respect with the Environment Rules and Consumers “Requirements”

1. Creation of a European genetic resource list for strawberry
2. Breeders’ evaluation methods and standardisation for disease resistance and fruit quality traits...

## COST Action 863 “EUBerry” 2005– 2010

EUROBERRY RESEARCH: FROM GENOMICS TO SUSTAINABLE PRODUCTION, QUALITY AND HEALTH ”

# European small berries genetic resources **GENRES036 (GENBERRY)**

## **Main objective**

To have a better appreciation of the European small berries genetic resources (strawberry and raspberry)

- (1) for preserving agricultural biodiversity
- (2) for better knowledge of the variability
- (3) for promoting these genetic resources (long term objective)

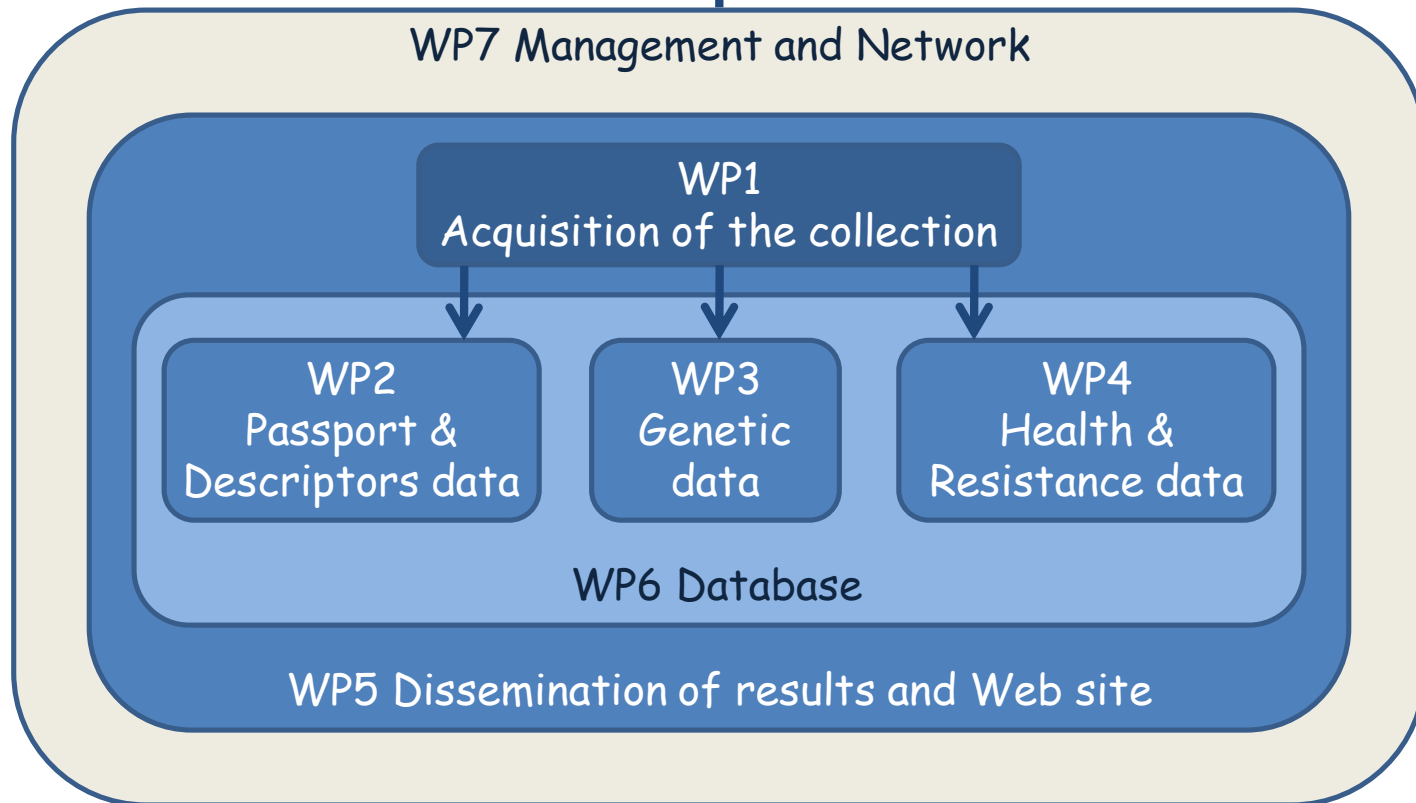
## **Main Deliverables**

- (1) Create a network for improving the conservation and the evaluation of small berries genetic resources
- (2) Standardization of markers for studying genetic diversity
- (3) Elaboration of a living European small berries database for strawberry

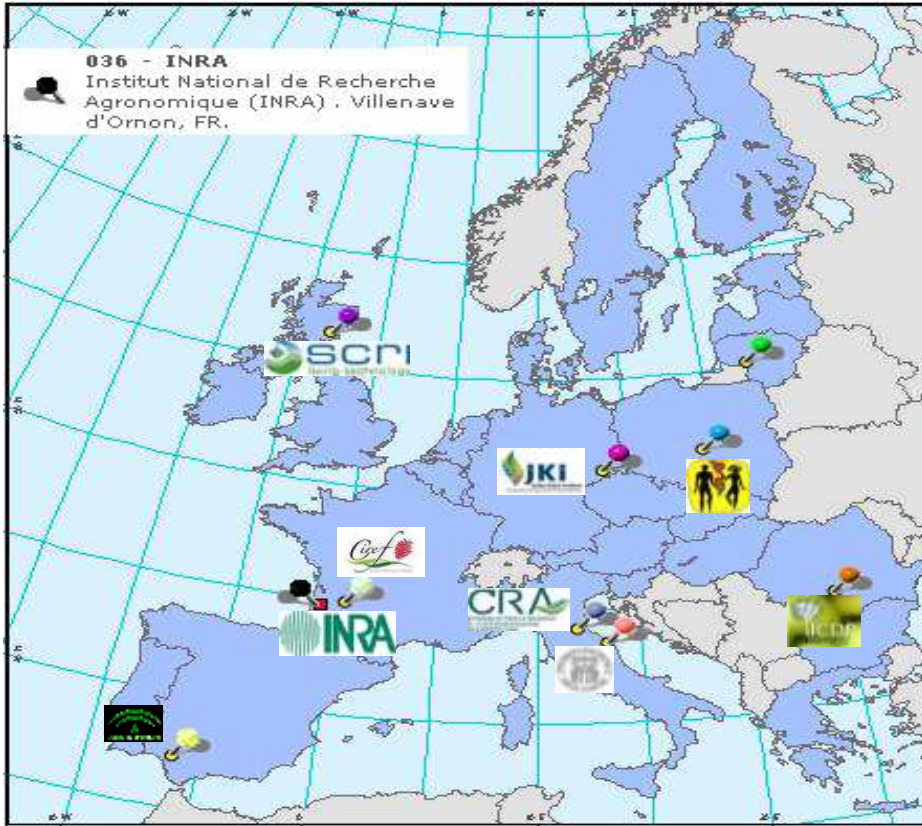
# Organisation of the project



European Commission



# European Small Berries Genetic Resources, GENBERRY



- 036 - LIH**  
Lithuanian Institute of Horticulture (LIH). Babtai, LT.
- 036 - INSAD**  
Research Institute of Pomology and Floriculture (INSAD). Skierniewice, PL.
- 036 - BAZ-IOZ**  
Bundesanstalt für Züchtungsforschung und Kulturpflanzen, Institut für Obstzüchtung (BAZ-IOZ) , Dresden, DE.
- 036 - FRIP**  
Research Institute for Fruit Growing Pitesti-Maracineni (FRIP), Pitesti, RO.
- 036 - SCRI**  
Scottish Crop Research Institute (SCRI). Dundee, UK.
- 036 - CRA-FRF**  
Consiglio per la Ricerca e la Sperimentazione in Agricoltura, Unità di ricerca per la frutticoltura (Forli) - CRA FRF (Forli). IT.
- 036 - SAPROV-UNIVPM**  
Marche Polytechnic University (SAPROV-UNIVPM). Ancona, IT.
- 036 - IFAPA**  
Instituto Andaluz de Investigación y Formación Agraria, Pesquera Alimentaria y de la Producción Ecológica (IFAPA). Sevilla, ES.
- 036 - CIREF**  
Création Variétale Fraises - Fruits rouges (CIREF). Douville, FR.

Public Institutes and one private group

208	genotypes added from the end of Cost836 and the end of GenBerry
among these 208 genotypes	
135	genotypes were added after Cost836 and at the beginning of the GenBerry project
73	genotypes were added along the GenBerry project

	Babtai	Douville, Ciref	Pillnitz, BAZ	Skierniewi ce	Pitesti	Cesena	Ancona	Málaga
Genotypes not maintained	19	14	24	7	33	26		
Genotypes introduced from cost	36	76	72	90	67	145		
Genotypes recently introduced	15	20	11	54	10	78		
Total of Genotypes	94	163	318	282	116	238	27	298

**WP1. Acquisition of the collection composition toward a rationalisation and conservation of ex situ collections and towards European small berries core collections**

**A Sasnauskas (LIH)**



**In-vitro-Cold storage at 4°C:**

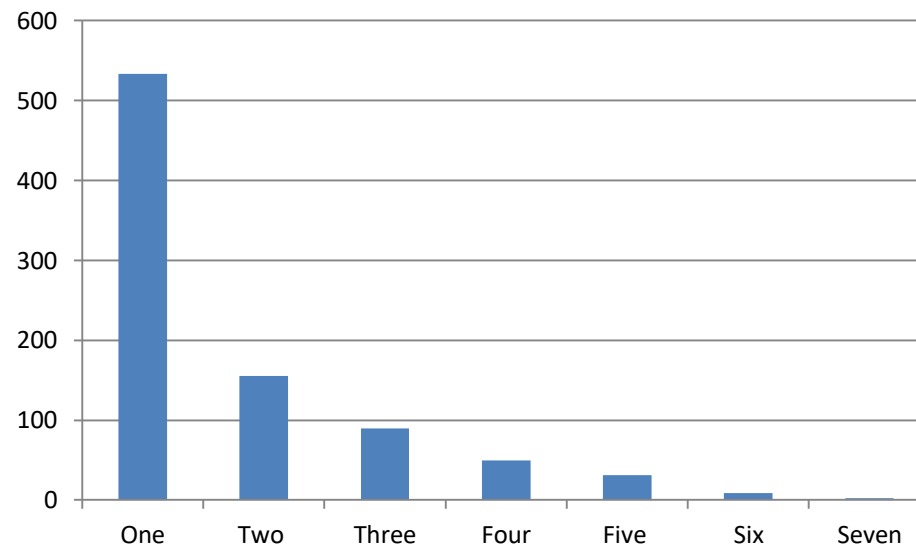


**Cryopreservation**



# List of the cultivated strawberry genotypes

A total of 870 genotypes in February 2011

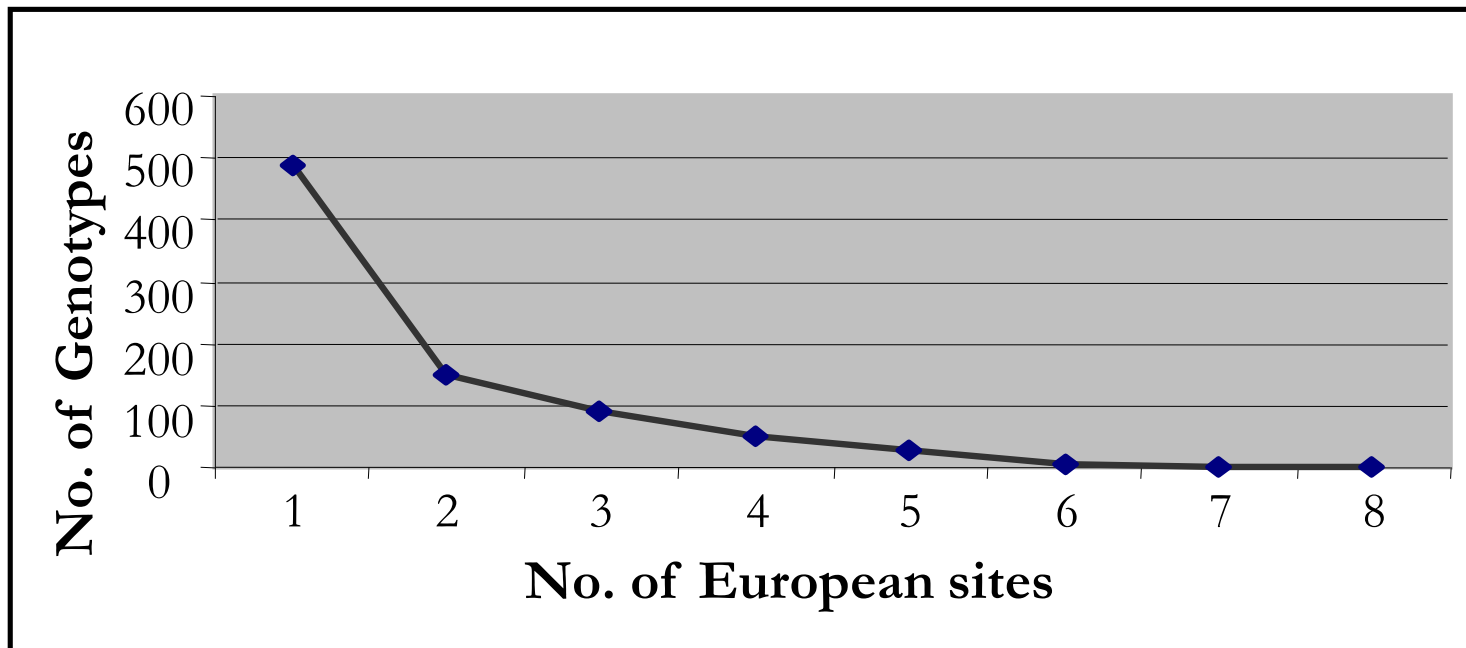




**WP1. Acquisition of the collection composition**  
toward a rationalisation and conservation of ex situ  
collections and towards European small berries core  
collections

**A Sasnauskas (LIH)**

Repartition of the number of genotypes according  
to the number of sites of European collection for  
the cultivated strawberry



## **Synonymies / non-synonymies identification based on pomologia knowledge**

1. Identification of synonymies because of error in spelling (e.g. Earlybelle instead of Earlibelle),

(Identification of synonymies because of translation in another language of the name of the genotype (e.g. Späte Leopold was traduce by Tardive de Leopold in French),

2. Identification of synonymies because the name of the obtentor was included in the name of the variety (e.g. Hummi Gento which is Gento),

3. Identification of synonymies because different names given when varieties were released as for recent varieties (e.g. Heidi which was named Vernie in France).

4. Pomologia books

5. Other Database reference

[http://www.ars.usda.gov/main/site\\_main.htm?modecode=53-58-15-00](http://www.ars.usda.gov/main/site_main.htm?modecode=53-58-15-00)





# Genberry WP2



## *Passport datas and descriptors*

Problems encountered for passport datas

*Difficulties to find appropriate datas: Plant Breeder Rights, type of protection*



*2009 test of the 3 different ways of maintainance used in Douville*

*Difficulty to have a good sanitary management of the plant and to keep flowers and fruits for observation*



# Genberry WP2



## Passport datas and descriptors

Problems encountered for descriptors

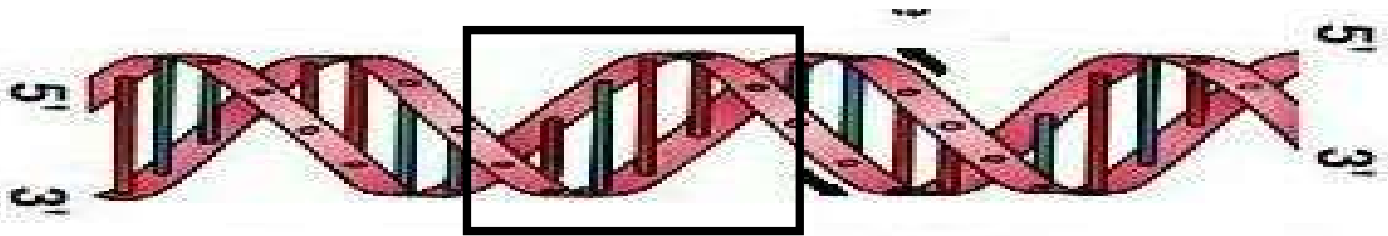


*Interaction between descriptors: colour of the leaves and glossiness*

*Difficulty to have the best reliable rating if made by students: needs training and time consuming*

*Some questions with the intermediate ratings*

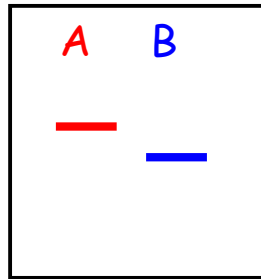
WP3. Characterisation of the genetic diversity of a representative part of the collections with molecular markers, using microsatellites already developed



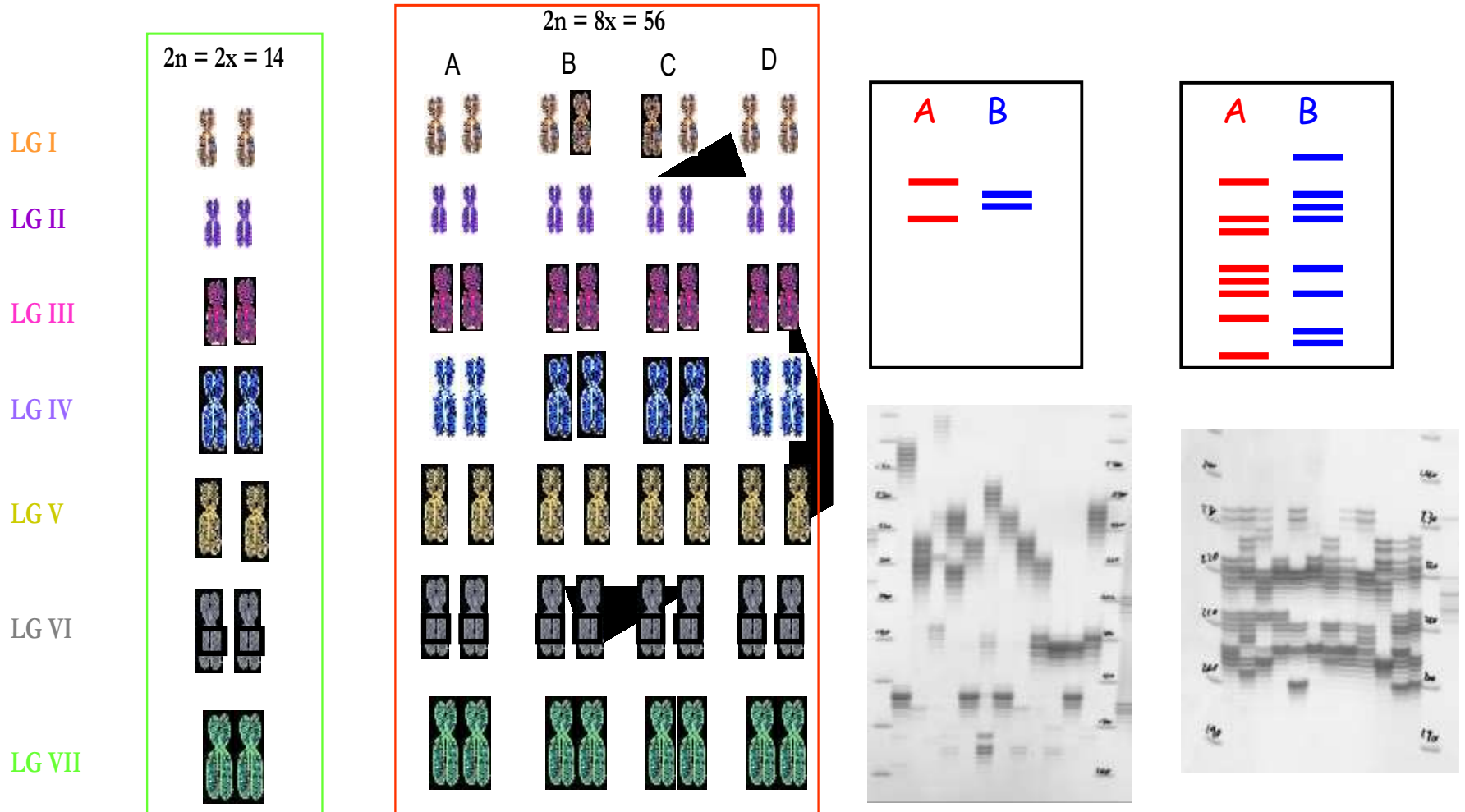
Genotype A



Genotype B

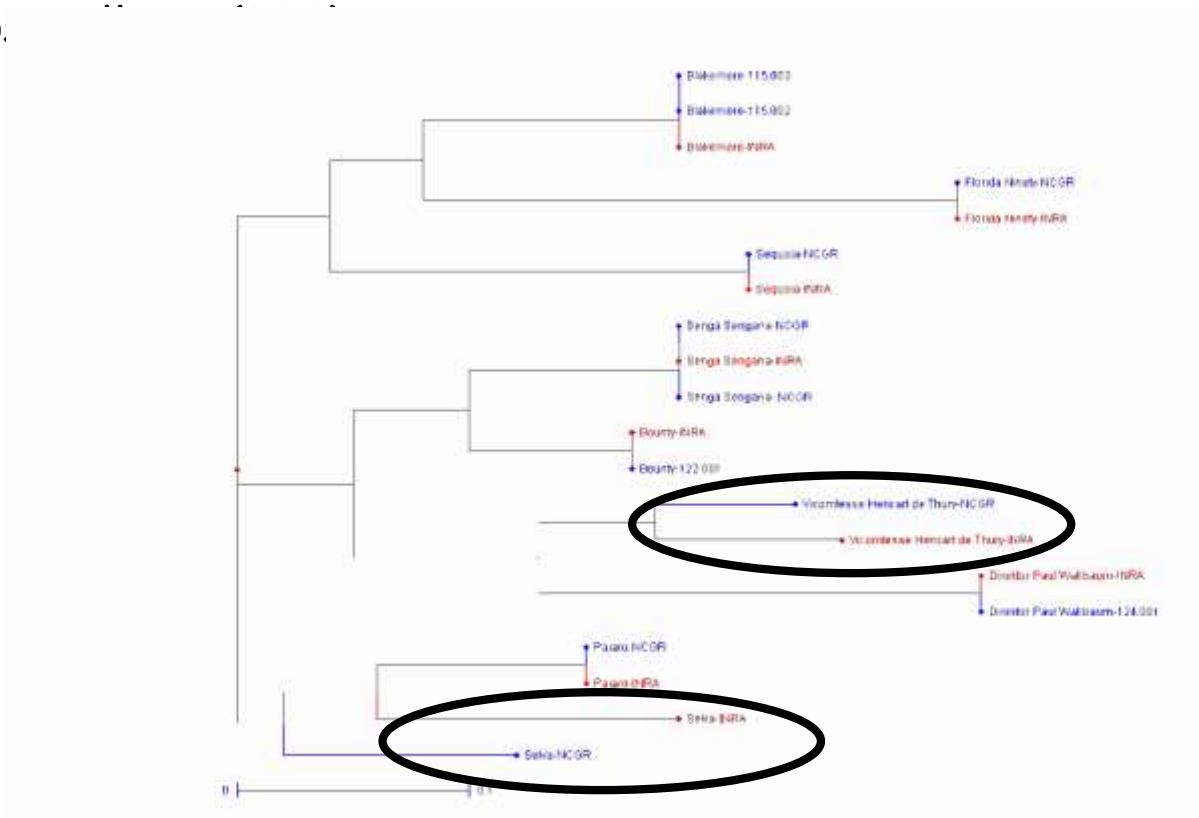


**WP3. Characterisation of the genetic diversity of a representative part of the collections with molecular markers, using microsatellites already developed**



**WP3. Characterisation of the genetic diversity** of a representative part of the collections with molecular markers, using microsatellites already developed

Comparison of genotypes between different origins using micro.

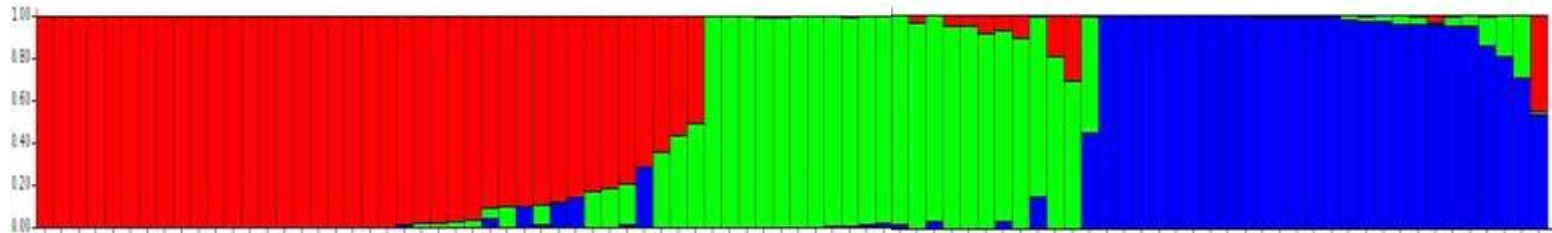




**WP3. Characterisation of the genetic diversity** of a representative part of the collections with molecular markers, using microsatellites already developed

## First results on strawberry

Structure of the collection of the cultivated strawberry, *Fragaria x ananassa*



**Pop1** Californian varieties (C) and modern varieties that include pedigree with 'C'

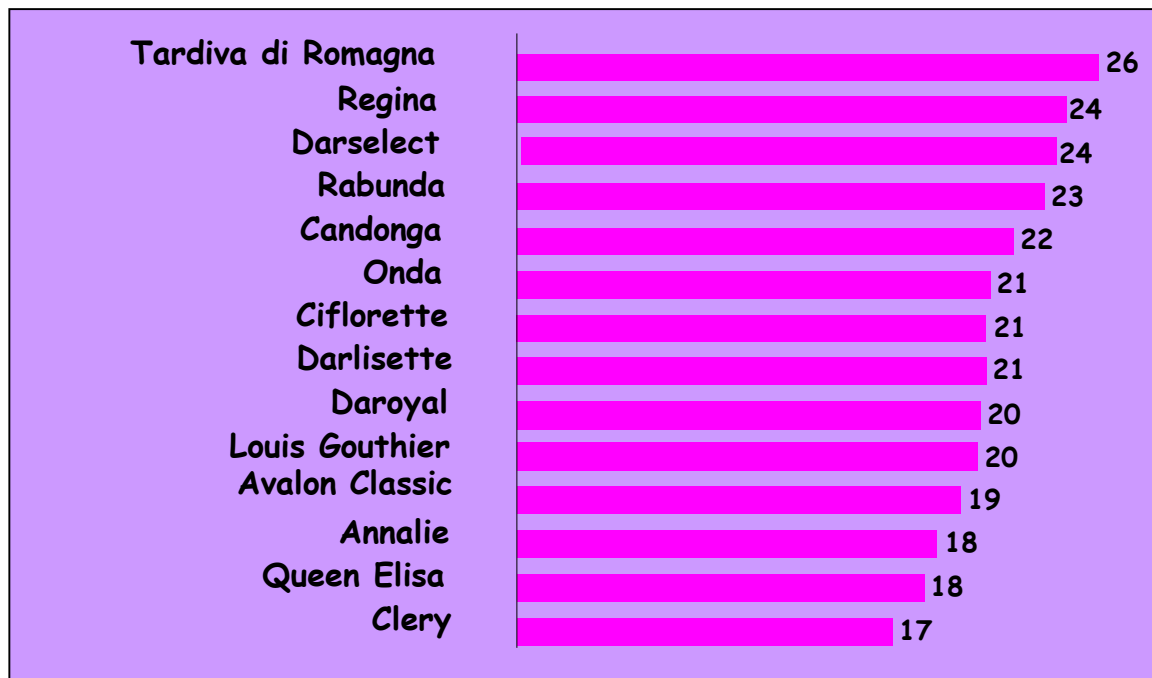
**Pop2** Introgressed varieties or intermediate varieties

**Pop3** Old European varieties

**WP4. Characterisation for biochemical components** linked to health nutritional values (total antioxidants and vitamin C) and for **disease resistances**

## Fruit quality

Total antioxidant capacity (mmol TE/ g fw - TEAC bioassay)



**WP4. Characterisation for biochemical components** linked to health nutritional values (total antioxidants and vitamin C) and for **disease resistances**

## Resistances



Infested field of raspberry



Controlled inoculation of stawberry

**WP6. Elaboration of a living European small berries database sustained by a continuous long term network co-operation**

<https://www.bordeaux.inra.fr/genberry/>



The image shows the homepage of the GenBerry website. At the top, there is a red banner with the 'GenBerry' logo in a stylized, cursive font. To the right of the logo are images of strawberries and a person. Below the banner, the text 'Genetic Resources of Small Berries' is visible. The main content area features the INRA logo and the text 'European small berries genetic resources !' next to the European Union flag. The central focus is the 'GenBerry (GENRES 036) Enter' title in a large, stylized font. Below this, it states 'Project co-funded by the European Commission, Directorate for Agriculture and Rural Development'. Further down, it provides the project dates (September 2007 - October 2010), the coordinator (National Institute for Agricultural Research, INRA France), and the number of participants from 8 countries (France, Italy, Poland, Lithuania, Germany, Great Britain, Spain, Romania). The total cost is listed as 710099 €. At the bottom, there is a blue box with the European Union flag and the text 'Agriculture and environment'. Navigation links for 'Summary', 'Partners', 'Bibliography', 'Links', and 'Private' are provided. The footer includes the publication director (Beatrice DENOYES-ROTHAN), the site and graphic design (Jean Luc RENOUX), and the copyright notice (© INRA 2008) with a 'résumé' link and a small French flag.

**GenBerry**  
Genetic Resources of Small Berries

**INRA** European small berries genetic resources ! 

**GenBerry (GENRES 036)**  
*Enter*

Project co-funded by the European Commission, Directorate for  
Agriculture and Rural Development

Dates: september 2007- october 2010

Coordinator: National Institute for Agricultural Research, INRA France

10 Participants from 8 Countries: France, Italy, Poland, Lithuania, Germany, Great Britain, Spain, Romania

Total cost: 710099 €

 Agriculture and environment

[Summary](#) | [Partners](#) | [Bibliography](#) | [Links](#) | [Private](#)

Publication director : [Beatrice DENOYES-ROTHAN](#) Development of the site and Graphic design : [Jean Luc RENOUX](#)  
Copyright © INRA 2008 résumé 





### 1. **Passport data**

List of descriptors defined by WP2

+ EURISCO standardized Multi Crop Passport Descriptors  
(defined by FAO and *Bioversity International* )

### 2. **Phenotypic data**

List of primary and secondary descriptors defined by WP2

+ Pictures of plant, fruit, flower, leaves

1 MS  
Excel  
file per  
partner

### 3. **Molecular data**



1 MS Excel file  
compiled by Aniko  
Horvath (INRA)

# The database philosophy

GENOTYPE

ACCESSION

INDIVIDUAL

MOLECULAR DATA (SSR  
or SNP)

PHENOTYPIC DESCRIPTION

DIET  
AGRICULTURE  
ENVIRONMENT



# The database philosophy

## GENOTYPE

Ex: "Sequoia" cultivar

## ACCESSION

1 accession  
at CRA

1 accession  
at JKI

1 accession  
at CIREF

## INDIVIDUAL

x plants

6 plants  
(pots)

10 plants  
(soil)

3 plants  
(pots)

## MOLECULAR DATA

genotyped  
(26 SSR)

## PHENOTYPIC DESCRIPTION

observed  
in 2009

observed  
in 2008

observed  
in 2009

observed  
in 2009

observed  
in 2009

It is very important  
to know from which  
institute the DNA  
was extracted for  
each cultivar

DIET  
AGRICULTURE  
ENVIRONMENT



# Synonym search: Example 2 (no strict value)



## Accession group search



[Sign in](#)

[Home page](#)

### Accessions

- [List all accessions](#)
- [Quick search](#)
- [Advanced search](#)
- [Photo search](#)
- [Synonym search](#)

### Molecular markers

- [Marker search](#)
- [Molecular data search](#)

### Descriptors

[User handbook](#)

[Important links](#)

[Contact](#)

Search

Variety name   Strict value

Search

Results 1 to 19 on 19

Preferred name	Accession names part of the accession group	Synonyms	Validation date	Validation experts
CICLADE	CICLADE, 5026, FRA207	CICLADE		
CIFLORETTE	CIFLORETTE, 11, ITA410 CIFLORETTE, 5027, FRA207 CIFLORETTE, FRA020, ITA380	CIFLORETTE		
CIFRANCE	CIFRANCE, 13, POL029 CIFRANCE, 5028, FRA207 CIFRANCE, 664, ESP138 CIFRANCE, FRA021, ITA380	CIFRANCE		
CIGAEILLE	CIGAEILLE, 229, ESP138 CIGAEILLE, 5029, FRA207	CIGAEILLE		
CIGAEILLE		CIGAEILLE		
CIGALINE	CIGALINE, 10, ROM009 CIGALINE, 14, POL029 CIGALINE, 231, ESP138 CIGALINE, 5156, FRA207	CIGALINE		
CIGOULETTE	CIGOULETTE, 11, ROM009 CIGOULETTE, 15, POL029 CIGOULETTE, 200, ESP138 CIGOULETTE, 5030, FRA207 CIGOULETTE, FRA022, ITA380	CIGOULETTE		
CIOSEEE	CIOSEEE, 16, POL029 CIOSEEE, 301, ESP138 CIOSEEE, 5157, FRA207 CIOSEEE, FRA023, ITA380	CIOSEEE		
CIOSEEE		CIOSEEE		
CILADY	CILADY, 12, ROM009 CILADY, 17, POL029 CILADY, 201, ESP138 CILADY, FRA024, ITA380	CILADY		
CILOE	CILOE, 18, POL029 CILOE, 228, ESP138 CILOE, 5158, FRA207 CILOE, FRA025, ITA380	CILOE		
CIRAFINE	CIRAFINE, 5031, FRA207 CIRAFINE, FRA026, ITA380	CIRAFINE		
CIRANO	CIRANO, 19, POL029 CIRANO, 199, ESP138 CIRANO, 5159, FRA207 CIRANO, FRA027, ITA380	CIRANO		
CIRANO		CIRANO		
CIREINE	CIREINE, 20, POL029 CIREINE, 230, ESP138	CIREINE		
CISCO	CISCO, 736, ESP138	CISCO		
F. GRACILIS (01)	F. GRACILIS (01), 721, ESP138	F. GRACILIS (01)		
PLAROCIFRE	PLAROCIFRE, 727, ESP138	PLAROCIFRE		
VIVA PATRICIA	VIVA PATRICIA, 953, ESP138	VIVA PATRICIA		



**WP6. Elaboration of a living European small berries database sustained by a continuous long term network co-operation**

<b>PASSPORT DATA – INFORMATION ABOUT THE HOLDING INSTITUTE</b>				
<b>Accession code</b>	<b>National Inventory code</b>	<b>Institute code</b>	<b>Institute acronym</b>	<b>Acquisition date</b>
ACCECODE	NICODE (0)	INSTCODE (1)	INSTACRONYM	ACQDATE (12)
30 characters Max	3 characters	6 characters Max	10 characters Max	YYYY-MM-DD
= institute code – accession number – year of observation	See 'Partners'	See 'Partners'	See 'Partners'	Date when the accession
No official source				

<b>IDENTITY OF THE ACCESSION</b>				
<b>Accession number</b>	<b>Accession name</b>	<b>Original accession name</b>	<b>Synonyms</b>	<b>Genus</b>
ACCENUMB (2)	ACCENAME (11)	ACCENAME2	SYNONYMS	GENUS (5)
30 characters Max	text	text	250 characters Max	text
specific number of the holder	All letters in capitals, without any accent	First letter upper-case and all accents	List of synonyms with their respective book references in brackets	Fragaria
EURISCO	EURISCO	No official source	No official source	EURISCO
Ex: CGN00254	Ex: GRUA, BARAGANA	Ex: Grúa, Baragaña		Fragaria





**Diversity in *Fragaria x ananassa***





Thank you