Ongoing Conservation & Research Activities on Grapevine at the INRA-Montpellier

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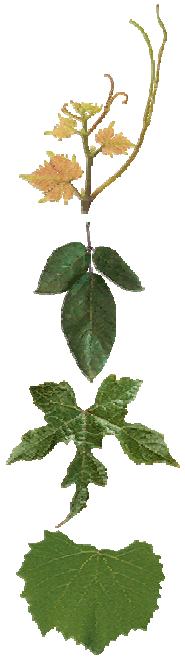
UMR 1097 DiAPC & Domaine de Vassal



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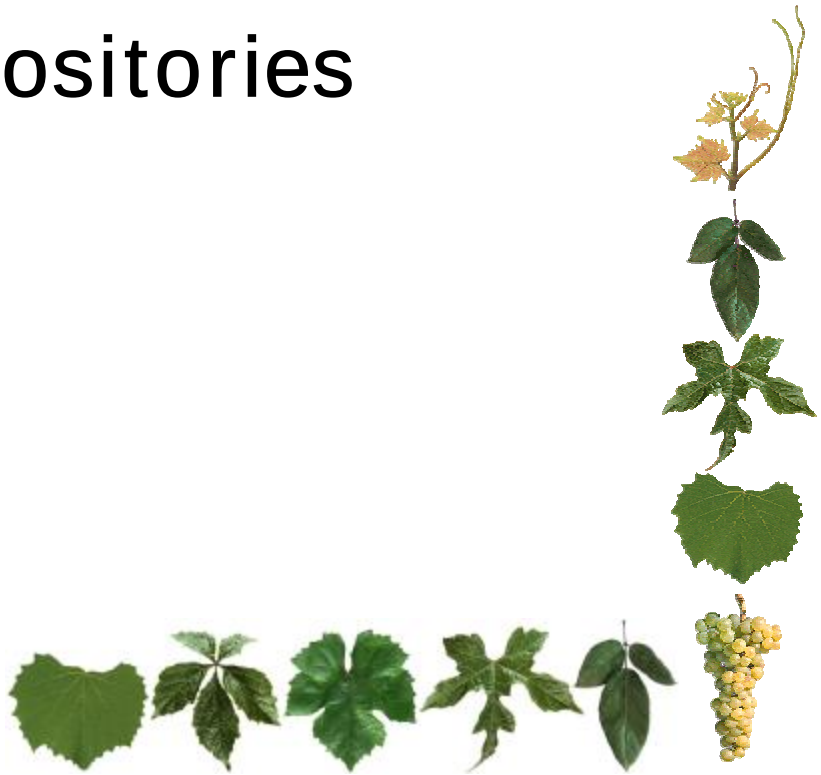
1. Conservation activities

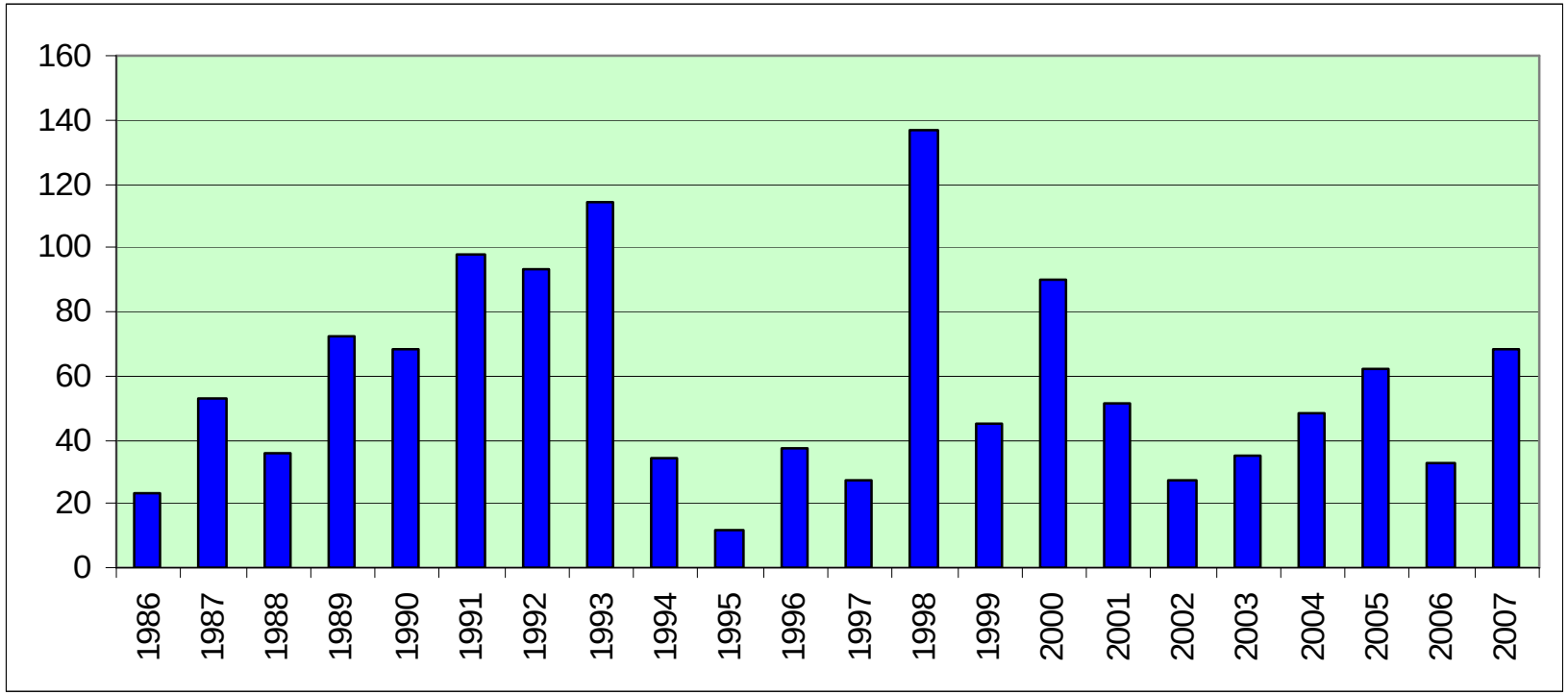
- Material acquisition
- Management of INRA-Vassal collection
- Identification
- French Grapevine Repositories Network
- Databases & Website



Introduction : the « Vassal » Collection

- Domaine de Vassal, INRA experimental station
- Main grapevine germplasm collection, since 1876
- More than 7000 accessions
  - 5100 *vinifera* acc. → 2500 cv.
  - 475 rootstock acc. → 225 cv.
  - 1116 intersp. Hybrids → 783 cv.
  - 245 *Vitis sp.* acc.

1.1. Material acquisition (number)



Mean = 57 / year

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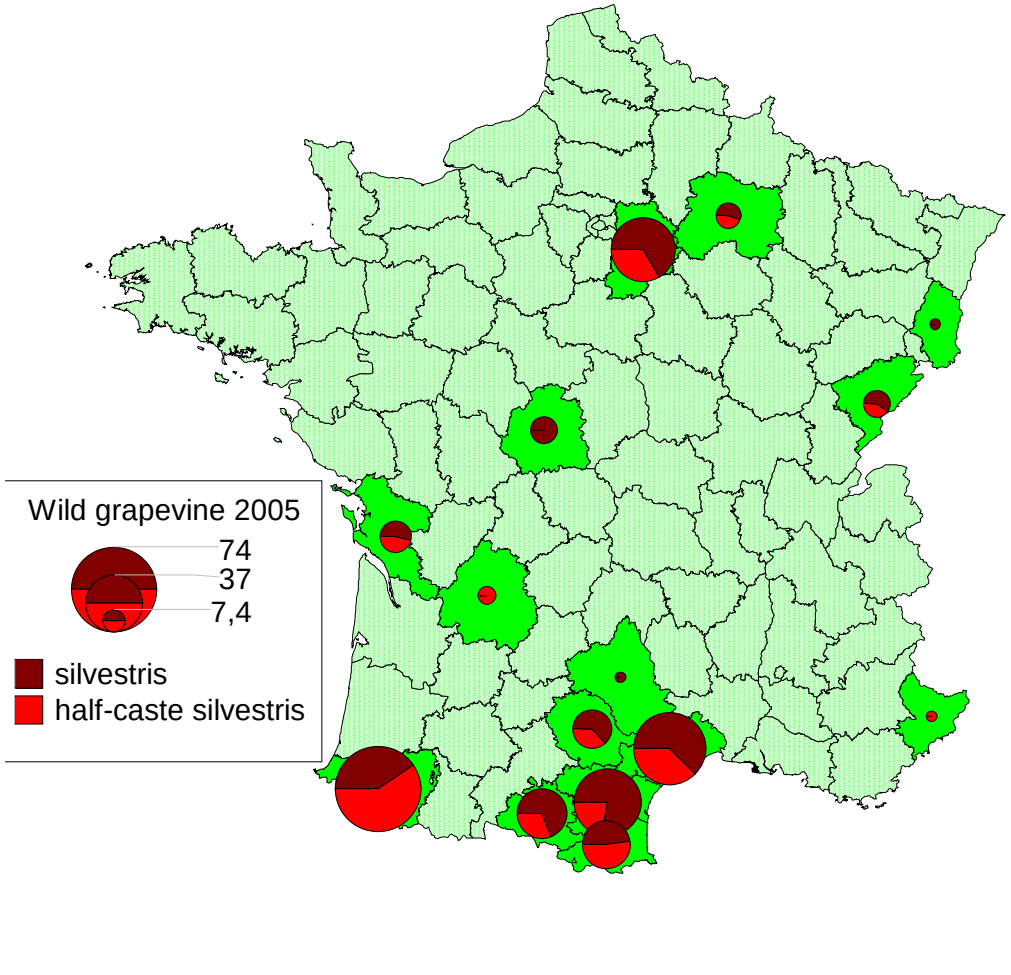
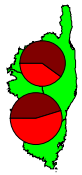
1.1. Material acquisition (cultivated)

- Exchanges with other collections
  - from France : French Network
  - from abroad : European Network, others
  - Quarantine station (Clermont-Ferrand city)
- Original prospectings in France
  - Oldest vineyards (8,5% in 2006)
  - Collaboration with local partners

1.1. Material acquisition (wild)





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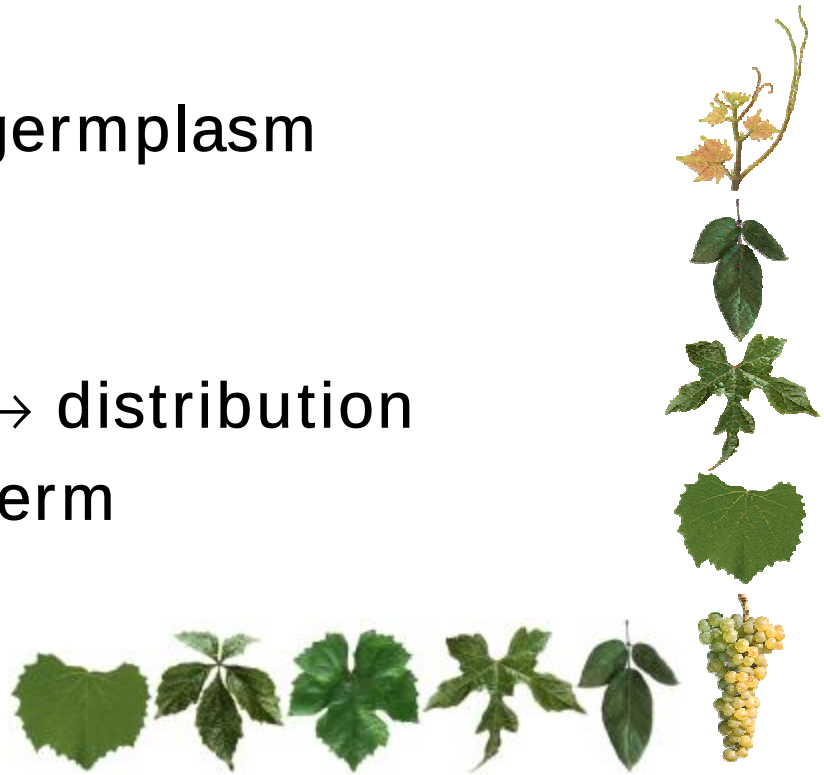
1.2. Management of INRA-Vassal Collection

- Usual transfert of collection plots
  - Phytosanitary aspects
  - Filing by geographical area
  - Elimination of some accession duplicates
- Quality Assurance
  - a general INRA policy for germplasm collections
- Safety duplicates
  - Insectproof greenhouses → distribution
  - Cryopreservation → long term



Safety duplicates

- Cryopreservation in liquid nitrogen (–196°C)
- Low cost
- Long term
- Seeds → ok
- Pollen ~ ok
- Winter buds : ongoing

- Insectproof greenhouses
- Renewal : 10 years ?
- Risk
- Cost

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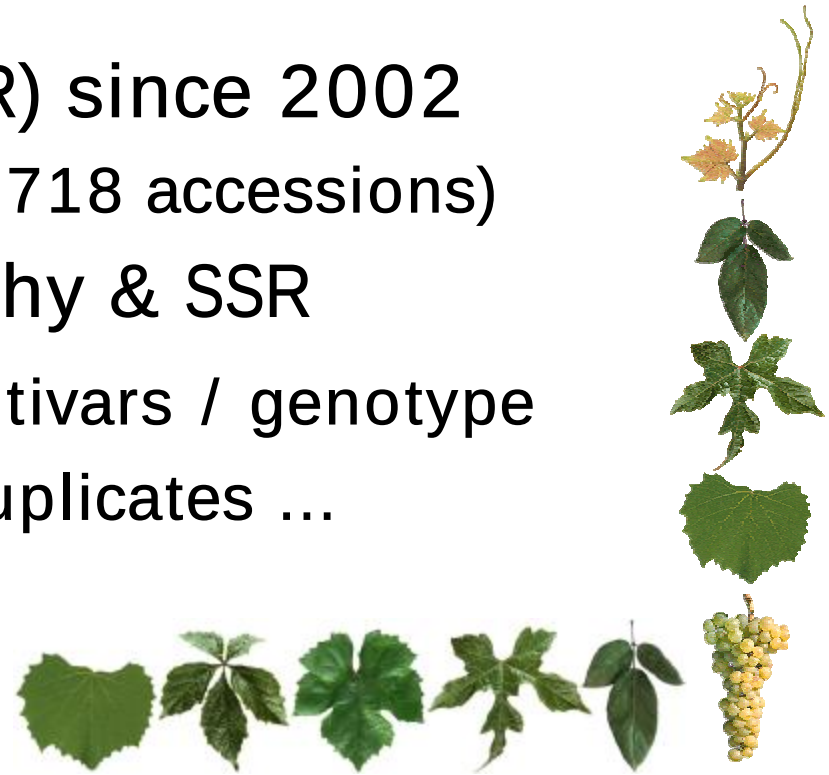
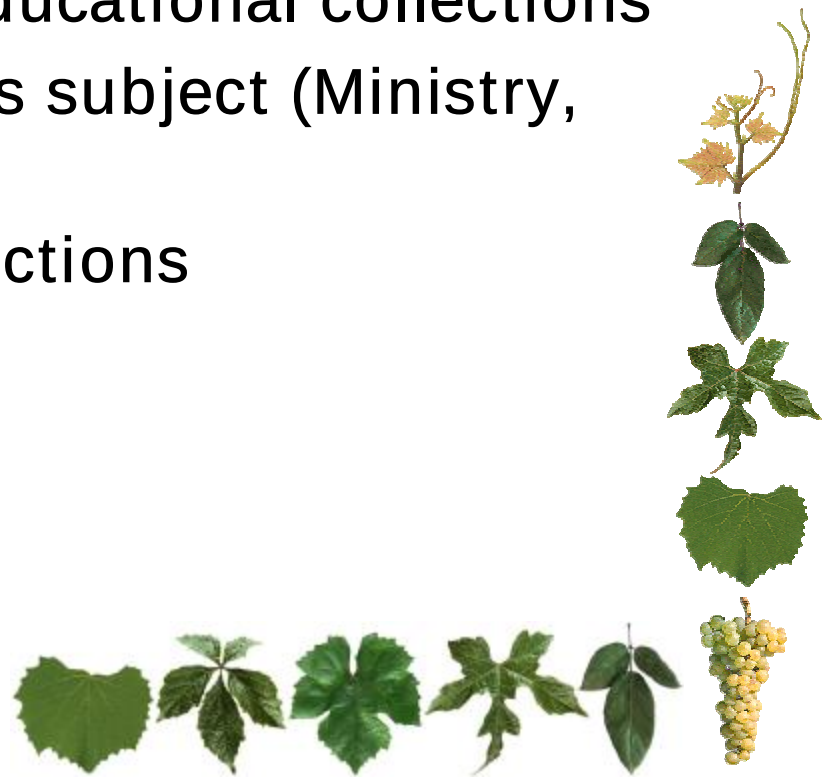
1.3. Identification (only *Vitis vinifera* presented)

- Ampelography work until 2002
  - 2500 *vinifera* cultivars (5100 accessions)
  - 1200 *vinifera* accessions non-identified
    - No reference
    - Too young
- Genotyping work (20 SSR) since 2002
  - 2256 unique genotypes (3718 accessions)
- Synthesis of ampelography & SSR
  - Finding mutations → *n* cultivars / genotype
  - Prime names of cultivar duplicates …

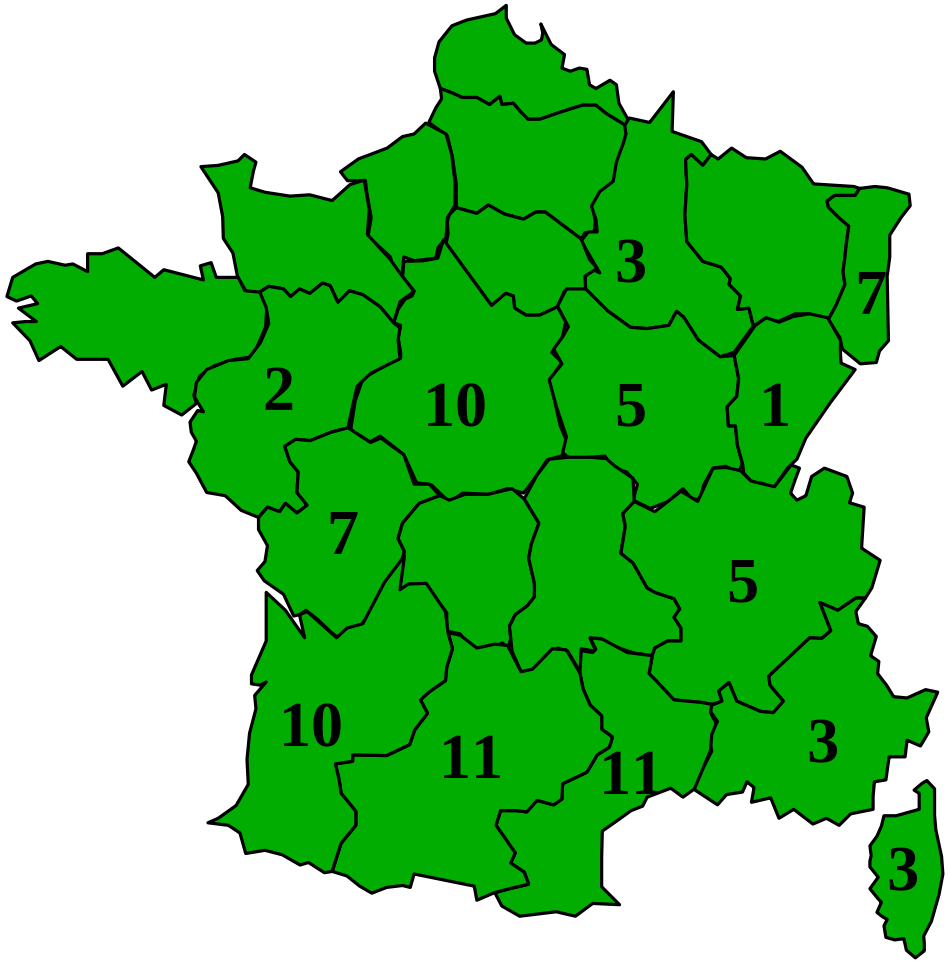


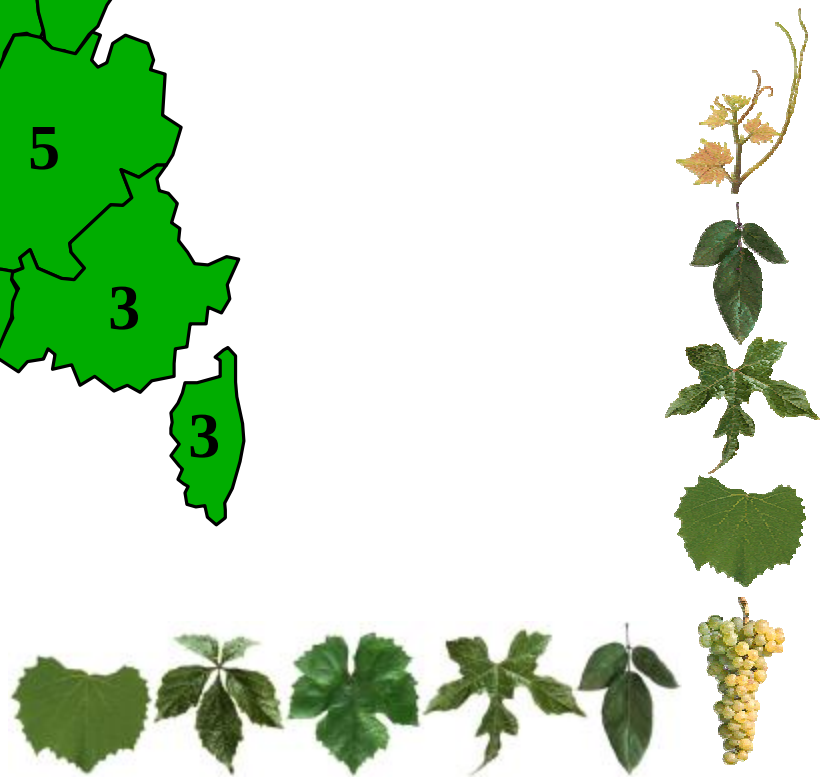
1.4. French Grapevine Collections Network

- INRA (Vassal, Bordeaux, Colmar, Angers)
- IFV (former ENTAV), national selection center
- Professional partners in regions (different status)
- Others: about 10 touristic/educational collections
- Administrations linked to this subject (Ministry, Viniflhor, INAO, etc.)
- Total of 45 actors ; 110 collections
- 15 to 18.000 clones



1.4. French Grapevine Collections Network





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1.4. French Grapevine Collections Network

- Wild species : 35 sp.
  - American and Asian Vitis sp. 400 accessions
  - Vitis vinifera subsp. silvestris 100 accessions *ex-situ*

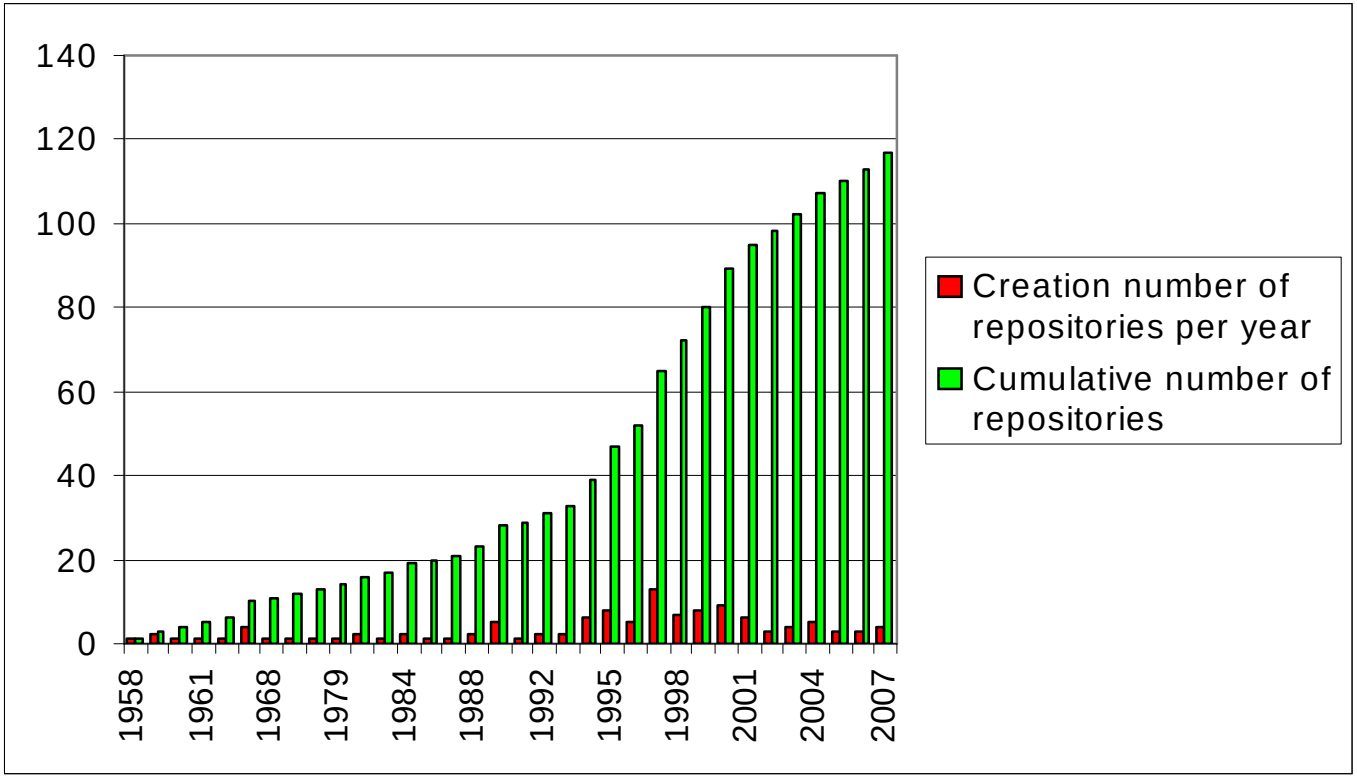
- Rootstocks 500 cv.
  - Authorized (&clones) 30 cv. (800 acc.)
  - Others 500 cv. (600 acc.)

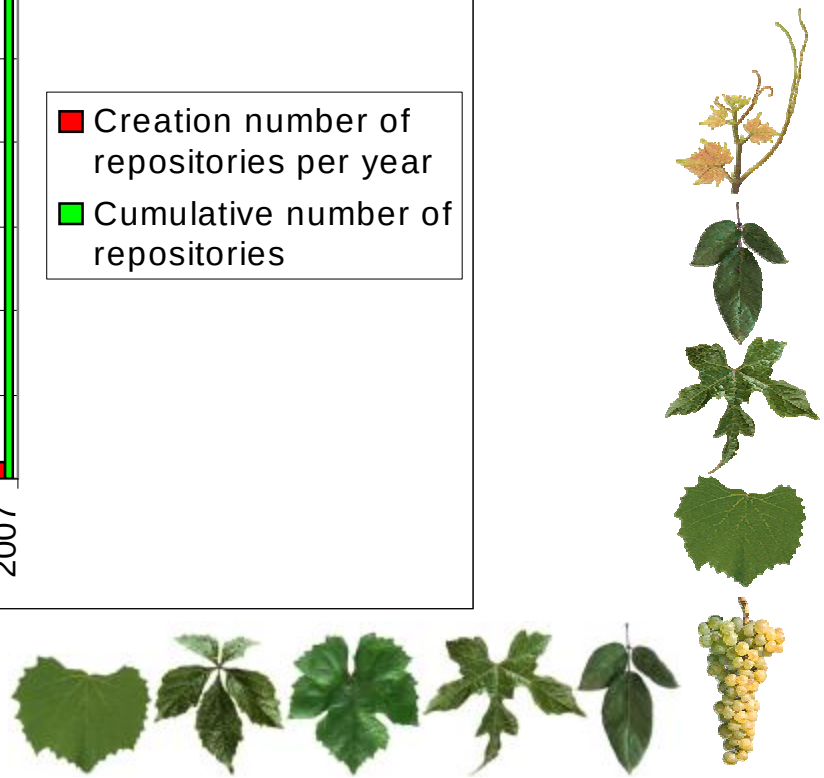
- Interspecific Hybrids 1.000 cv. (1.400 acc.)

- V. vinifera cultivars : 3 000 cv. (18 000 acc.)
  - Foreign & table cultivars 2.600 cv. (5.000 acc.)
  - French old cultivars 400 cv. (2.000 acc.)
  - Clones (national level) 4.000 accessions (228 cv.)
  - Clones (regional level) 15 to 18.000 accessions (105 cv.)

1.4. French Grapevine Collections Network

- Clone collections
  - Dates of creation : 1958 - until now
  - 117 regional repositories, number doubled since 1997
  - 105 cultivars with 1 or more regional repository





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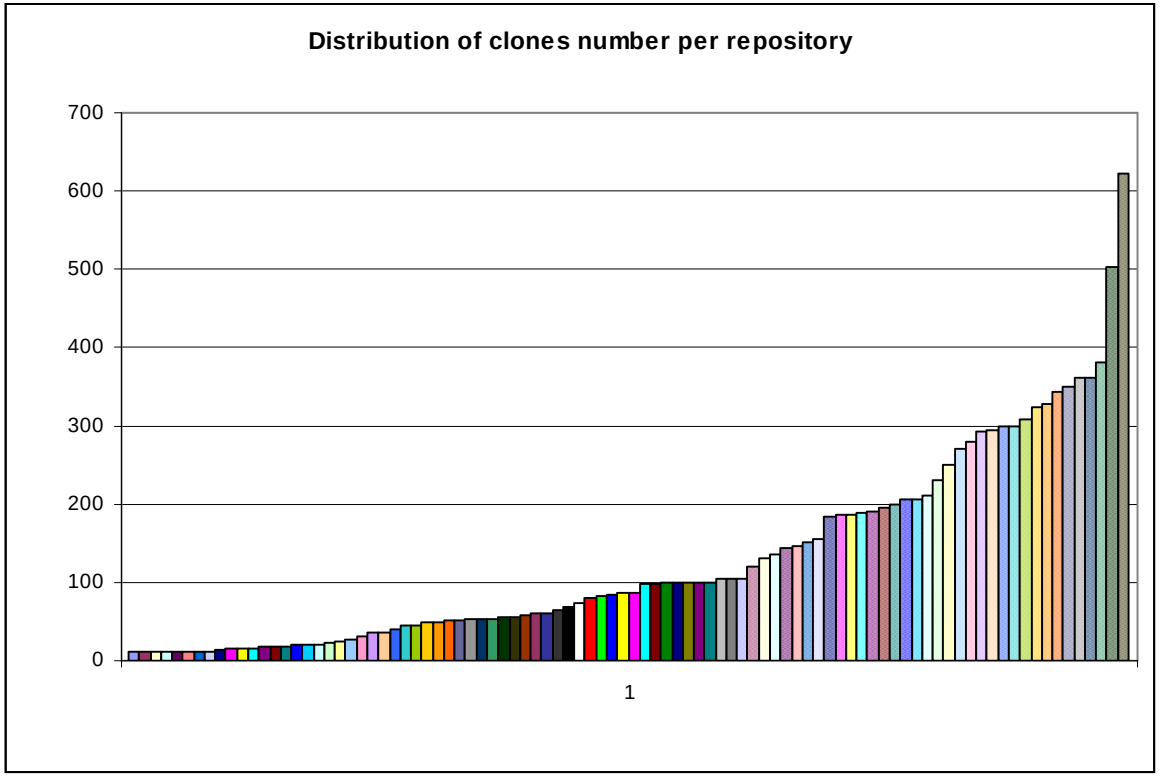
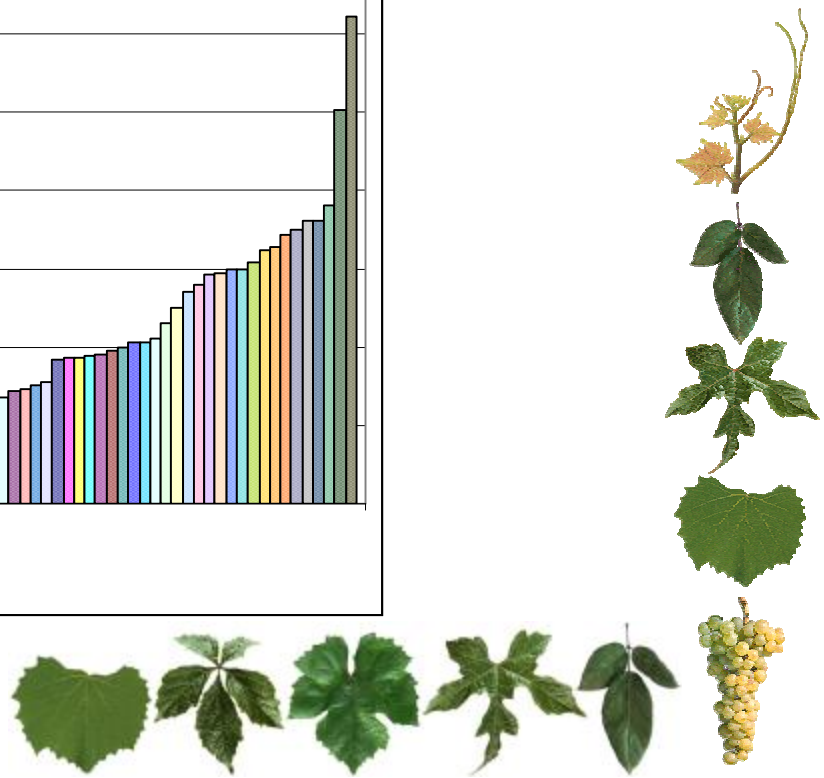
1.4. French Grapevine Collections Network

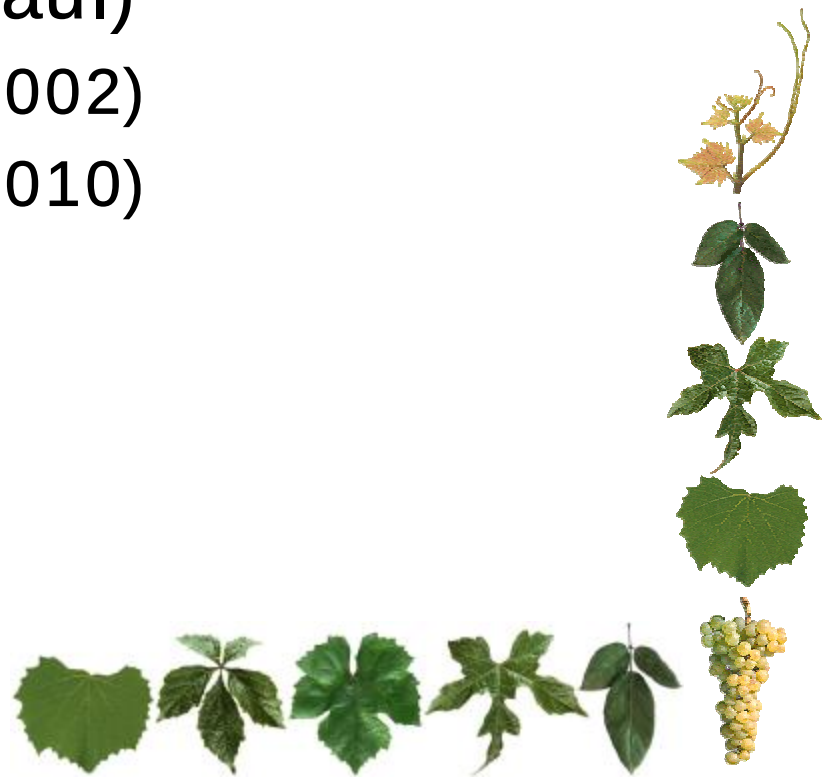
- Clone collections (continuation)
  - Number of clones per variety in collection : 10 to 622 (mean = 130)
  - Usually 50 to 350 accessions per repository, selected from 20 to 30 different vineyards, 5 to 10 vines per accession



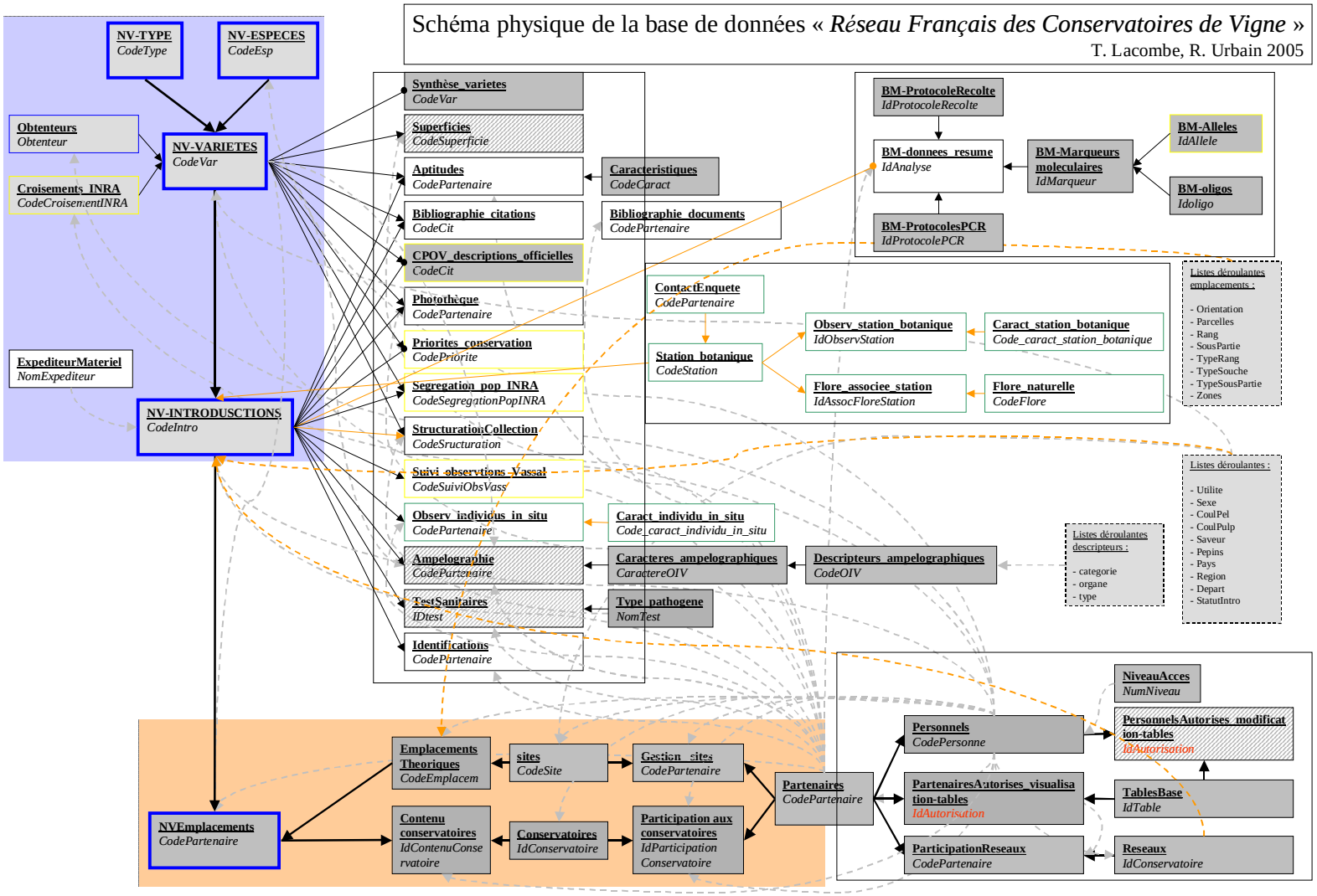


1.5. Databases & Websites

- INRA-Vassal / French Network Database
- INRA Multicrop Database (SIReGal project)
- European Database (E. Maul)
  - GenRes081 (1997-2002)
  - GrapeGen06 (2007-2010)
- INRA-Vassal Website



INRA-Vassal / French Network Database



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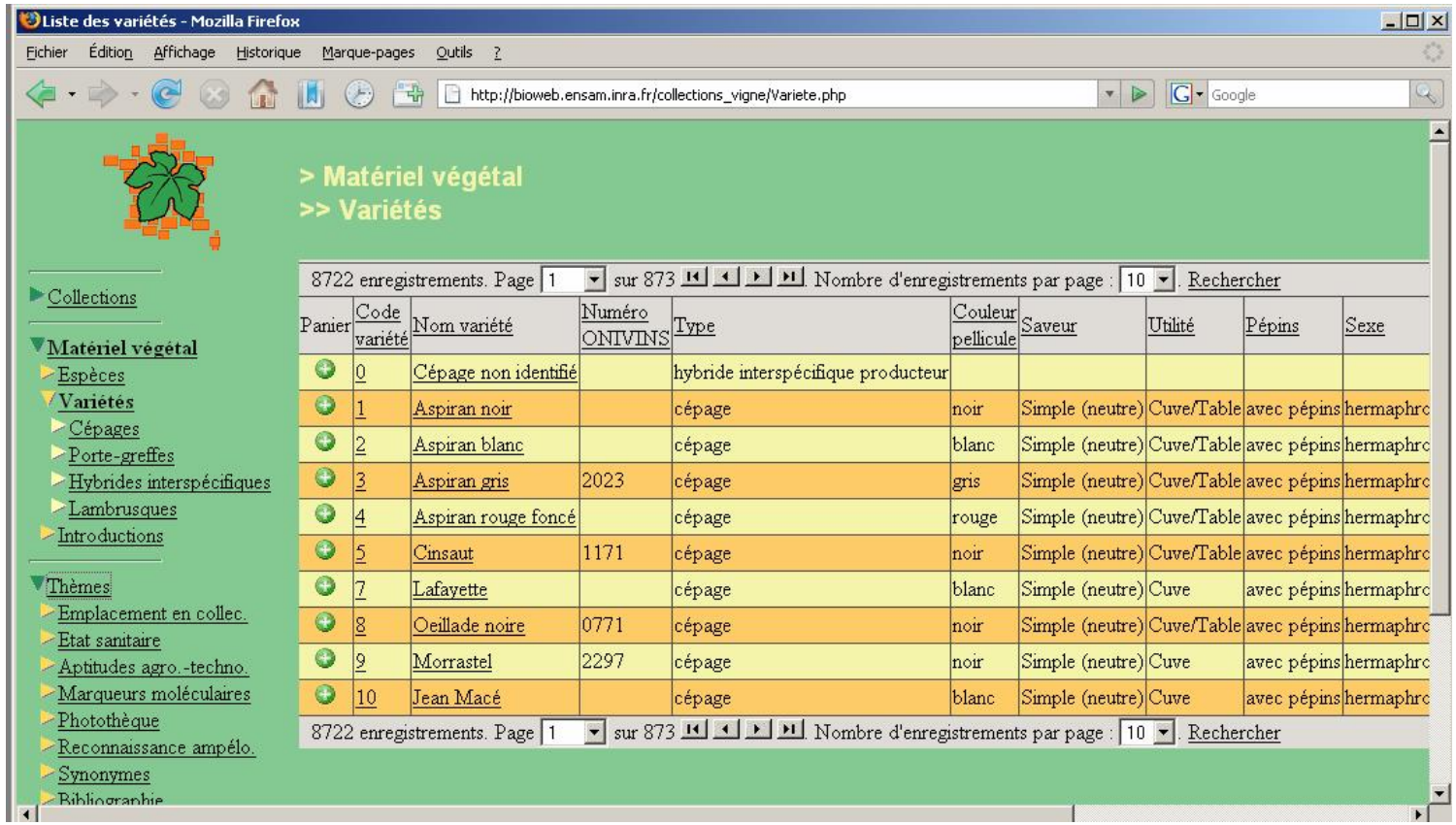
INRA-Vassal / French Network Database



Panier	Code variété	Nom variété	Numéro ONIVINS	Type	Couleur pellicule	Saveur	Utilité	Pépins	Sexe
	0	Cépage non identifié		hybride interspécifique producteur					
	1	Aspiran noir		cépage	noir	Simple (neutre)	Cuve/Table	avec pépins	hermaphro
	2	Aspiran blanc		cépage	blanc	Simple (neutre)	Cuve/Table	avec pépins	hermaphro
	3	Aspiran gris	2023	cépage	gris	Simple (neutre)	Cuve/Table	avec pépins	hermaphro
	4	Aspiran rouge foncé		cépage	rouge	Simple (neutre)	Cuve/Table	avec pépins	hermaphro
	5	Cinsaut	1171	cépage	noir	Simple (neutre)	Cuve/Table	avec pépins	hermaphro
	7	Lafayette		cépage	blanc	Simple (neutre)	Cuve	avec pépins	hermaphro
	8	Oeillade noire	0771	cépage	noir	Simple (neutre)	Cuve/Table	avec pépins	hermaphro
	9	Morrastel	2297	cépage	noir	Simple (neutre)	Cuve	avec pépins	hermaphro
	10	Jean Macé		cépage	blanc	Simple (neutre)	Cuve	avec pépins	hermaphro

8722 enregistrements. Page 1 sur 873. Nombre d'enregistrements par page : 10. Rechercher

bioweb.ensam.inra.fr/collections_vigne

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INRA-Vassal Station Website

www.montpellier.inra.fr

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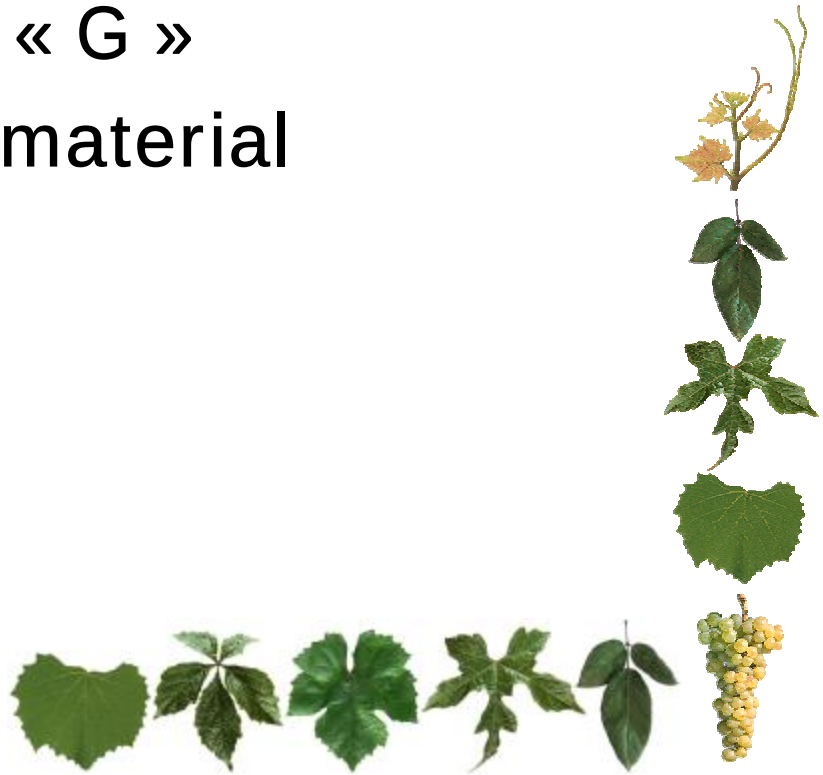
2. Research activities

- Molecular biology (tools)
- Parentage analysis
- Structuration of genetic diversity
- Core-collections « M » & « G »
- Reasoned choice of new material acquisitions



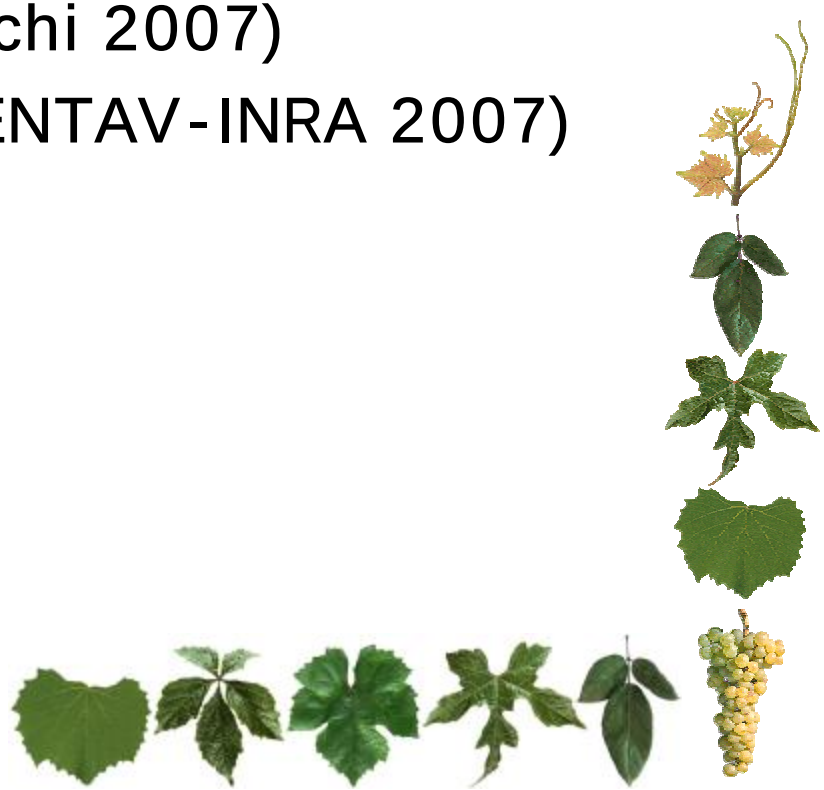
2.1. Molecular Biology (tools)

- 20 SSR markers
  - on 4300 accessions
  - Not only *Vitis vinifera*

- Gene analysis
  - Anthocyans
  - Berry size
  - others

2.2. Parentage analysis

- Cabernet-Sauvignon ; Chardonnay kin group (Bowers 1998 & 1999)
- Malvasias related cultivars (Lacombe 2006)
- Sangiovese kin group (Di Vecchi 2007)
- French authorized cultivars (ENTAV-INRA 2007)
- Fercal (Ollat 2007)
- Others... (in preparation)



Parentage of Malvasia related cultivars

Table 2 Parentages detected among the 49 varieties related to the name Malvasia on the basis of 20 SSR markers using FaMoz software.

Variety	Parent 1[a]	Parent 2[a]	LOD score
Malvasia de Colares*	Gibi	Amaral[1]	34.59
Malvasia del Lazio	Muscat d'Alexandrie	Frankenthal[2]	41.08
Malvasia di Candia fausse*	Muscat d'Alexandrie	Bombino bianco	44.53
Malvasia-Moscatel Fonte Grande	Muscat d'Alexandrie	Mantheudo	47.96
Mantheudo	Arinto do Dao[3]	Codega[4]	45.48
Mureto	Alfrocheiro	Jaen blanco[5]	40.10
Plavina crna	Primitivo[6]	Verdeca	41.47
Schiras Dr. Houbdine	Chaouch	Kecskecscu roszas piros	48.66
Subirat parent	Gibi	Tortozón	39.58
Torrontès riojano	Muscat d'Alexandrie	Mission[7]	37.95

[a] [1]Identical to Azal tinto, Caiño longo; [2]identical to Schiava grossa, Trollinger; [3]identical to Arinto do interior, Boal branco, Boal de Madère Boal de Natura; [4]identical to Alva, Borba, Mourisco branco; [5]identical to Pardina; [6]identical to Zinfandel; [7]identical to Païs.

*Indicates varieties without references.

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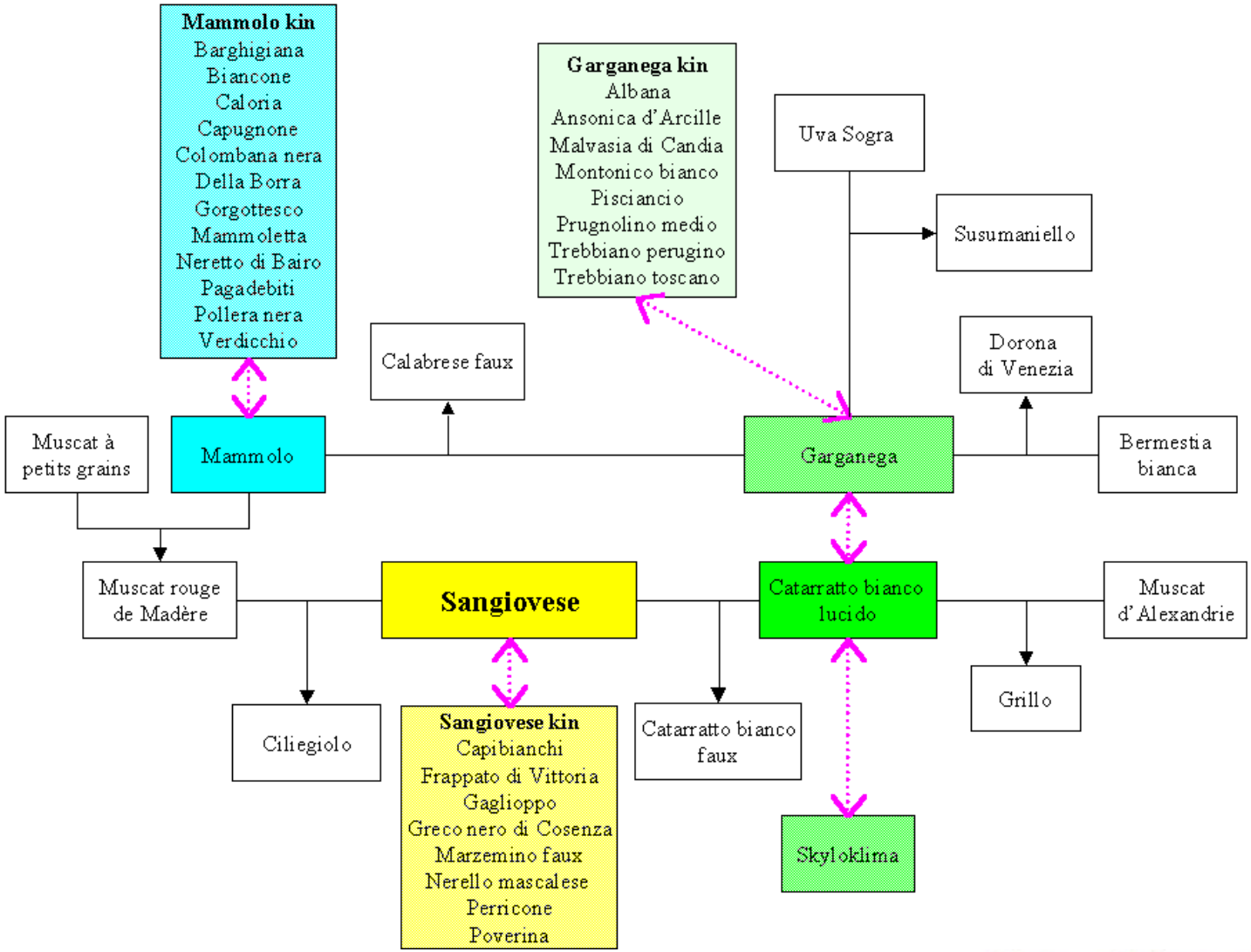
Sangiovese kin group



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2.3. Structuration of *V. vinifera* Genetic Diversity : 8 groups = 6 geographical groups + 2 varietal groups (Di Vecchi 2007)

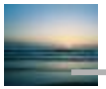

France


Italia


Iberic Peninsula


Balkans Area


Near & et Midle-East

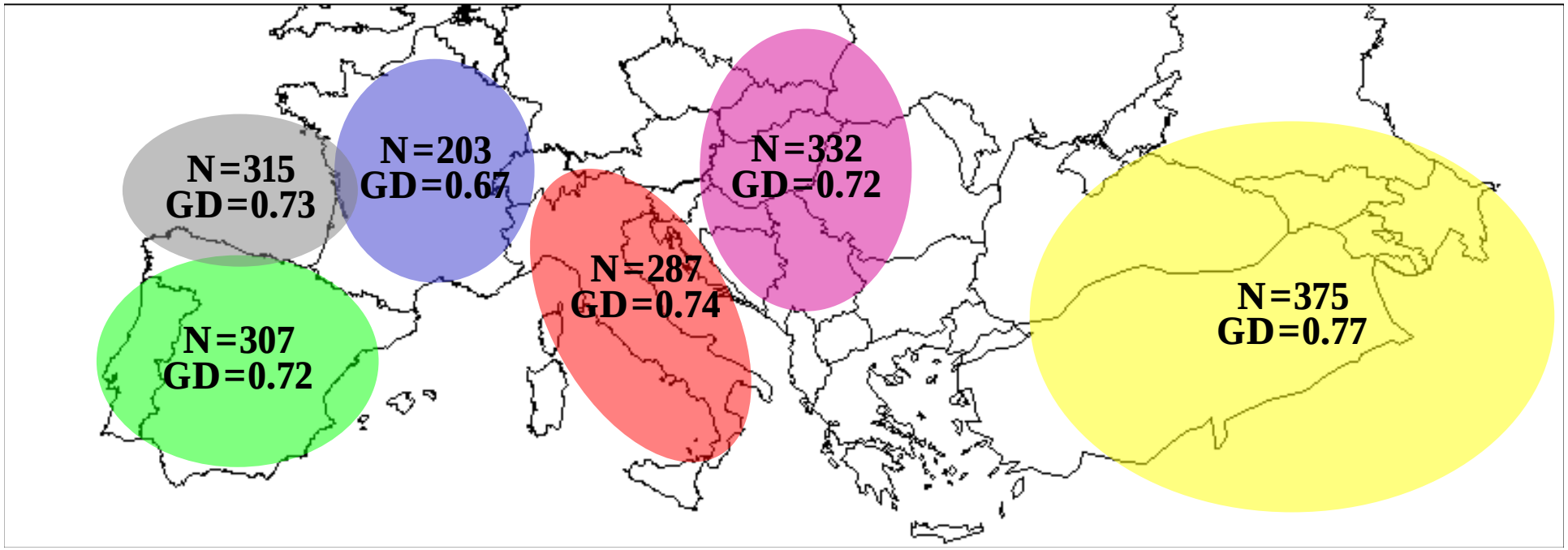

Atlantic Area


cv. ‘Chasselas’ (N=122; GD=0.71)


cv. ‘Muscat d’Alexandrie’ (N=237; GD=0.70)

N=nombre

GD=*gene diversity* (Nei, 1987)



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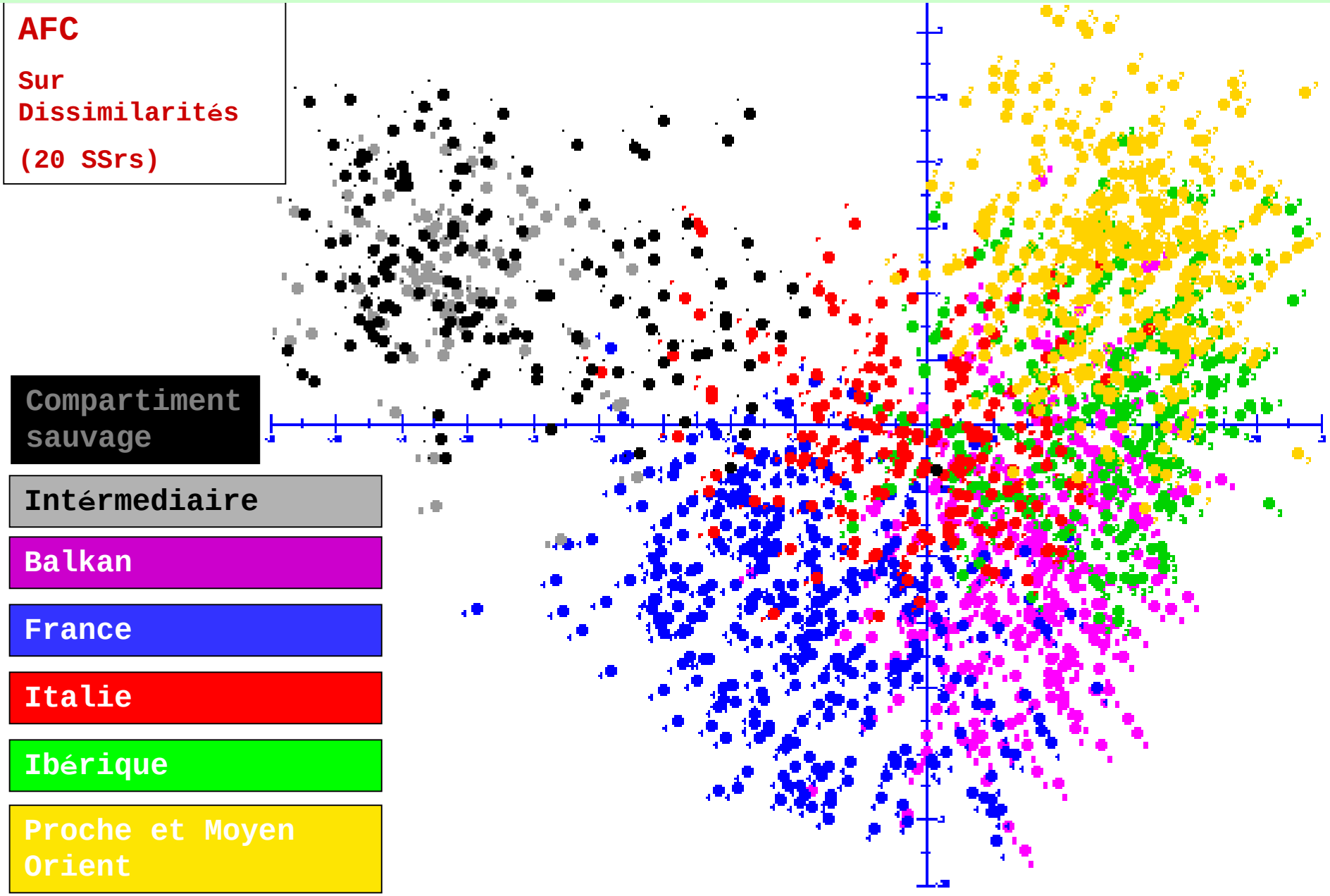
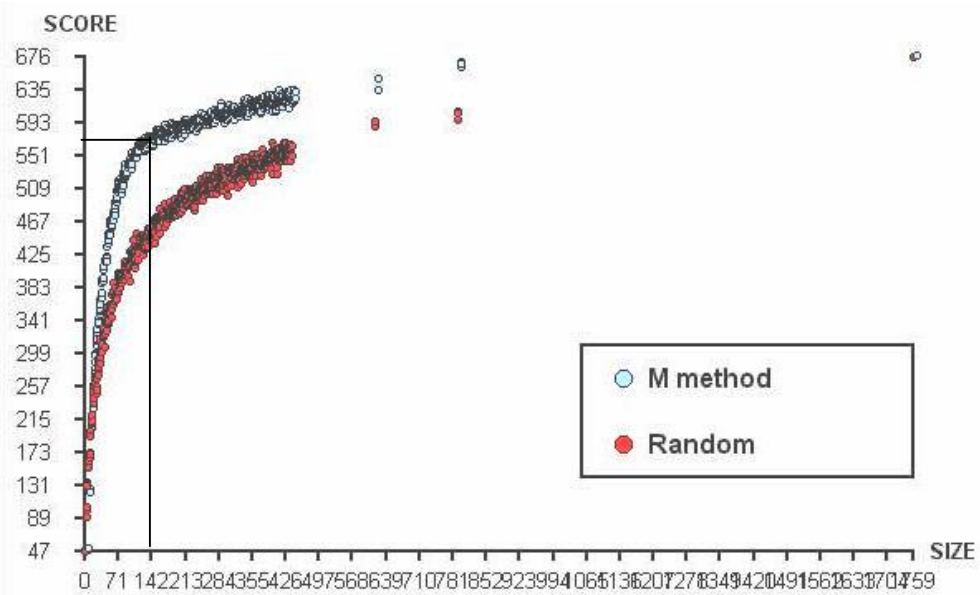
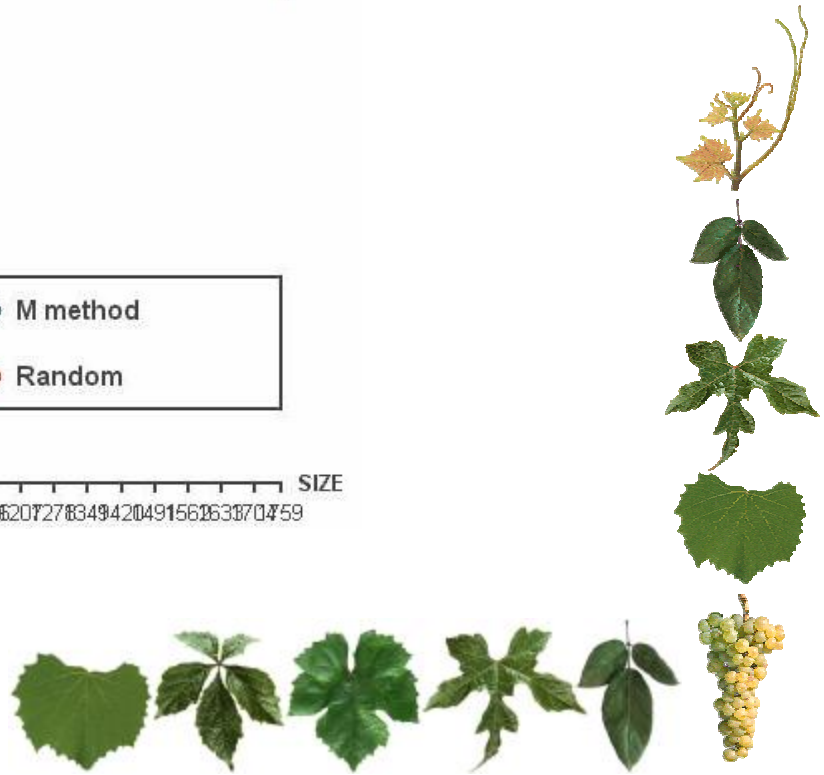


2.4. Core-collection « M » (Barnaud 2005)

- Bases on 50 ampelographical characters
- 141 individuals
- Conservation of SSR alleles with frequency > 0.5%

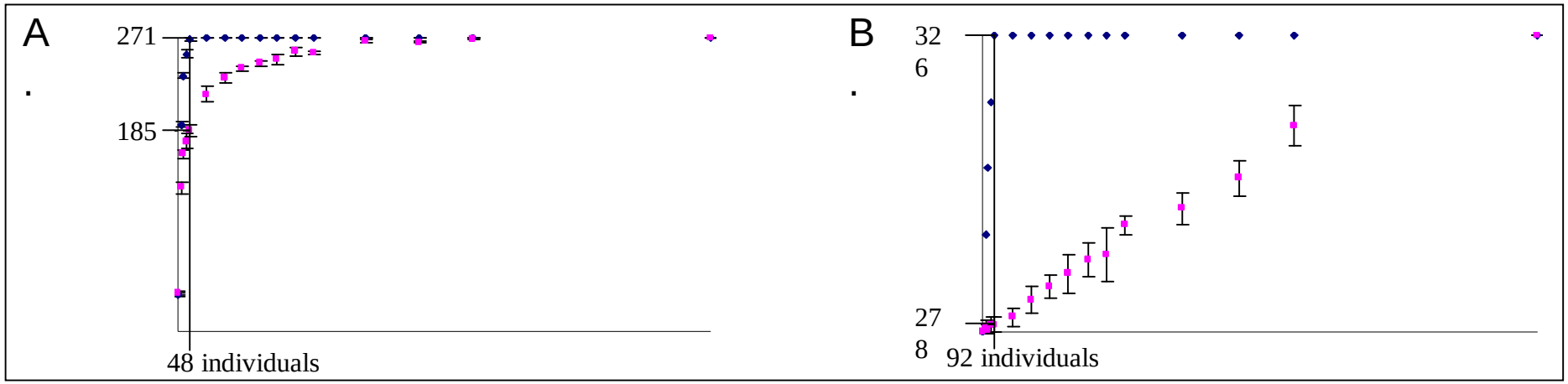


Redondancy



2.4. Core-collection « G » (Le Cunff p.c.)

- Bases on 20 SSR markers
- 92 / 48 / 24 individuals



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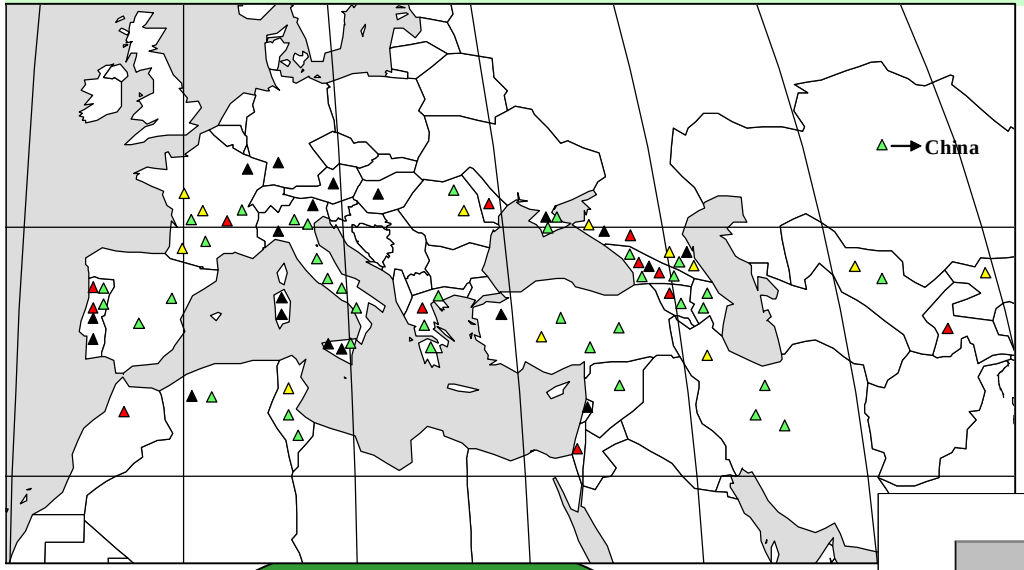

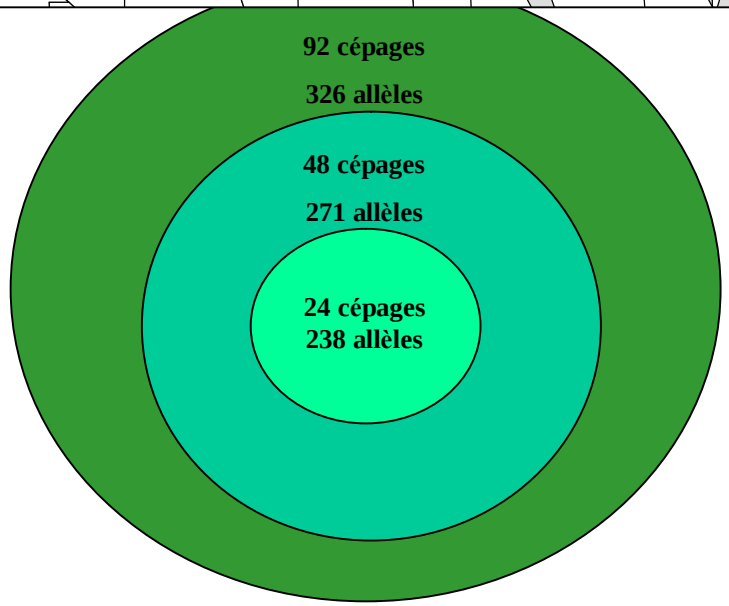

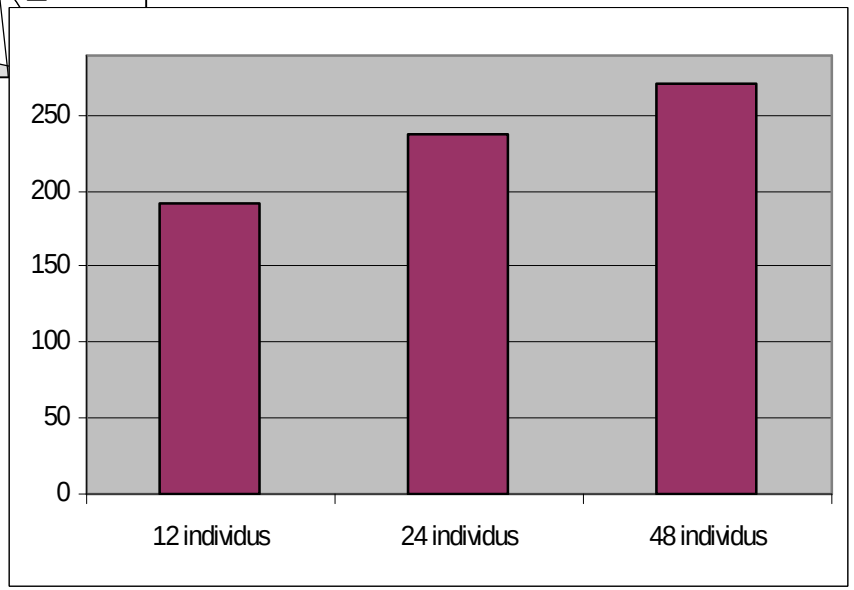

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2.5. Conclusion

- Reasoned choice of new material acquisitions
- Better knowledge of grapevine identity and evolution
- Usefull data for breeding programs

Thank you