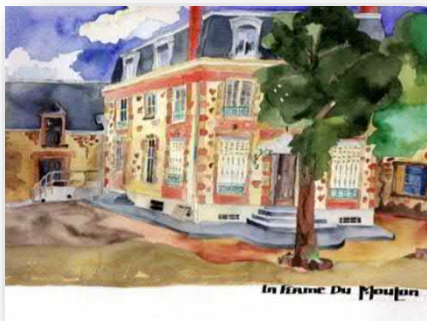




IMPORTANCE, RATIONALE AND EXPECTATIONS OF ESTABLISHING AN ECPGR MAIZE WORKING GROUP

First Meeting of the ECPGR Maize Working Group
2-3 December 2019, Belgrade, Serbia



Alain Charcosset, Violeta Andjelkovic,
Pedro Revilla, et al.

Previous Steps

RESGEN88 (<http://www1.montpellier.inra.fr/gap/resgen88/>)

- 1997-2001, EU project, Portugal, Spain, Italy, France, Germany, Greece and Netherlands
- Analysis of landraces, definition of nested core-collections

-> Important advance, but no formal European cooperation on maize Genetic Resources since then

-> Clear willingness to renew and expand the cooperation

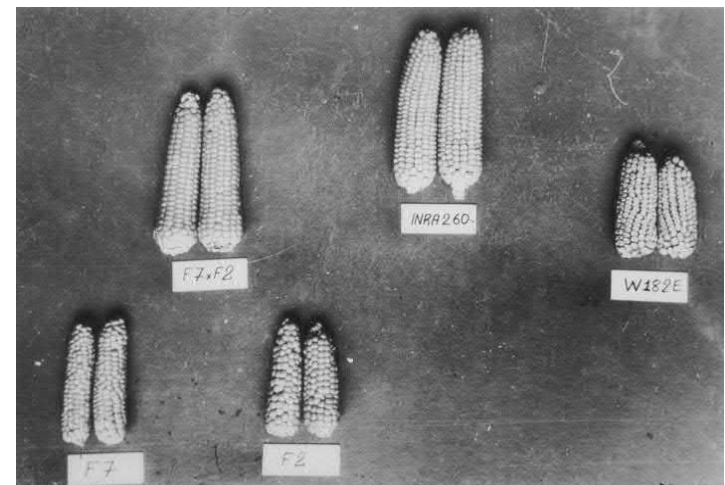
- Side meeting at Eucarpia Maize and Sorghum conference (Montpellier 2015)
- Side meeting at Eucarpia Genetic Resources conference (Montpellier 2017)
- Formal application to form an ECPGR group May 2018

-> Approbation by ECPGR October 2018, for Phase X (2019-2023)

Importance - Rationale

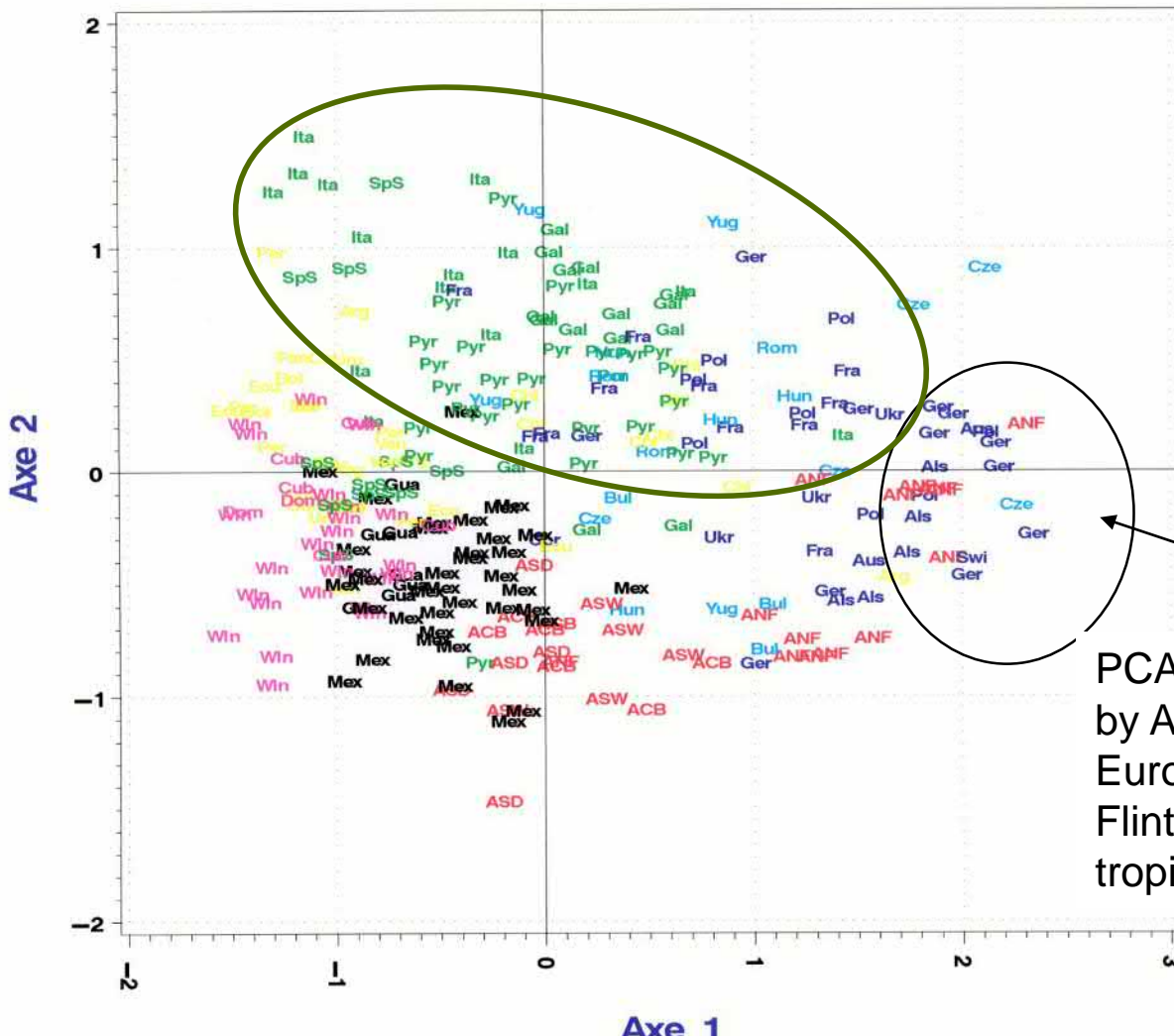
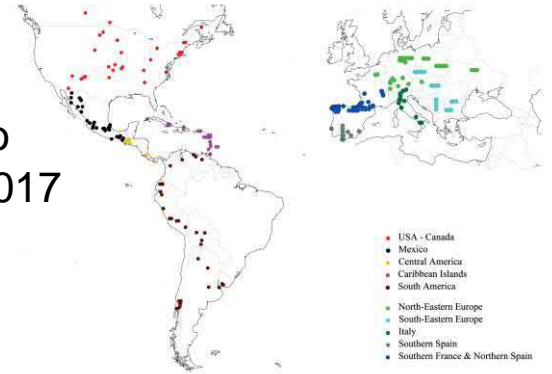
- Maize is an important crop in Europe since Discovery of Americas
 - First introduced in 1493 in Southern Spain
 - Later introductions, migrations, hybridizations, local selection, etc. lead to original Landraces with diversified uses
 - Some Landraces still actively used, other have been instrumental to develop inbred lines that proved excellent hybrid parents when crossed to US dent

Example of lines F2 and F7
(From Lacaune Landrace) in
France in the 1960s
-> Maize was cultivated again
in northern France



Originality of European Landraces, as inferred from molecular markers

here 24 SSR, coop. CIMMYT, Dubreuil et al., 2006, see also Dubreuil et al., 1998, Rebourg et al., 2003, Brandenbourg et al., 2017



America:

- Mexico - Guatemala
- USA - Canada - Chili
- Caribbean
- Southern America

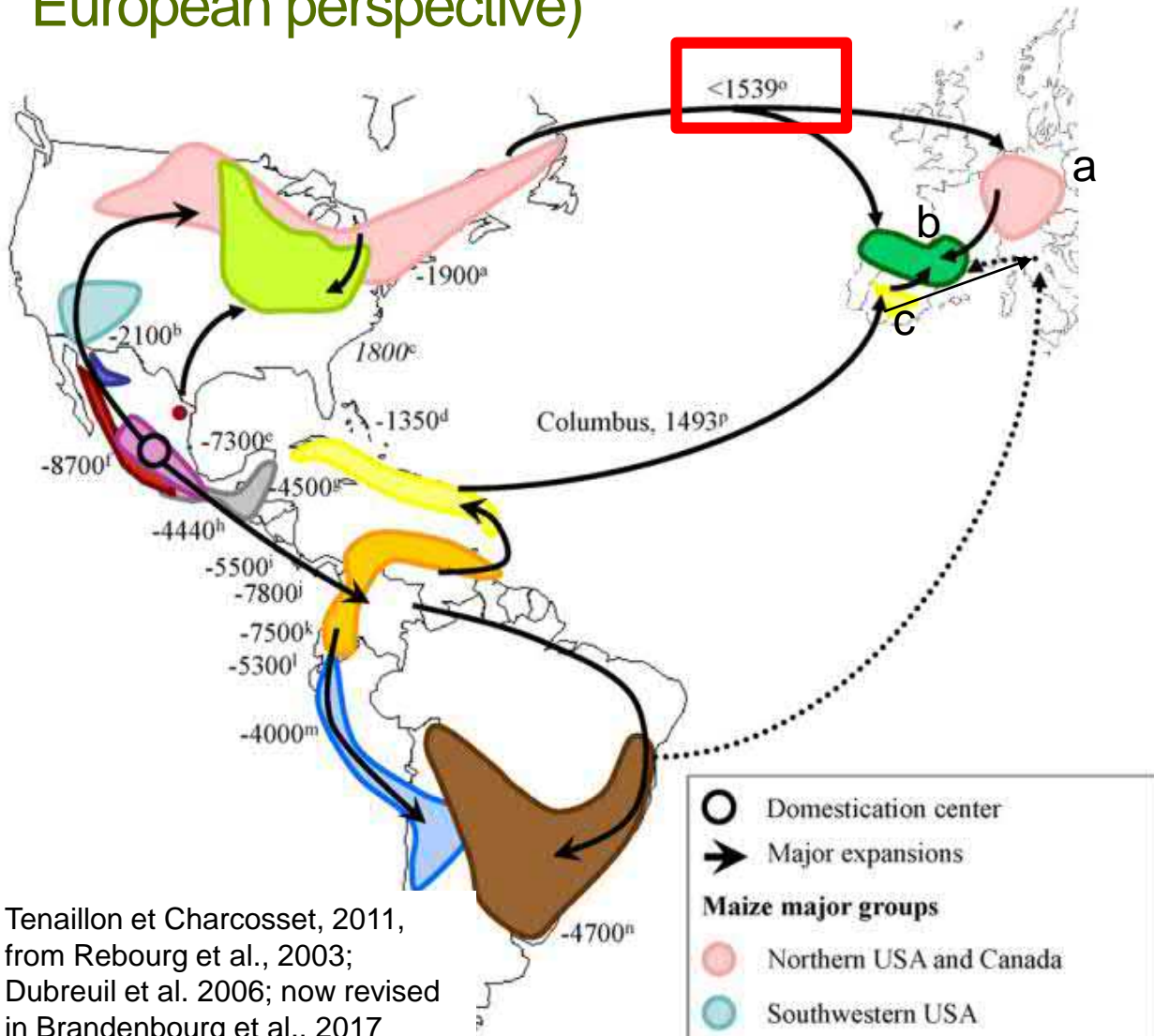
Europe:

- Spain – Pyr - Italy
- France– North-Eastern
- Balkans

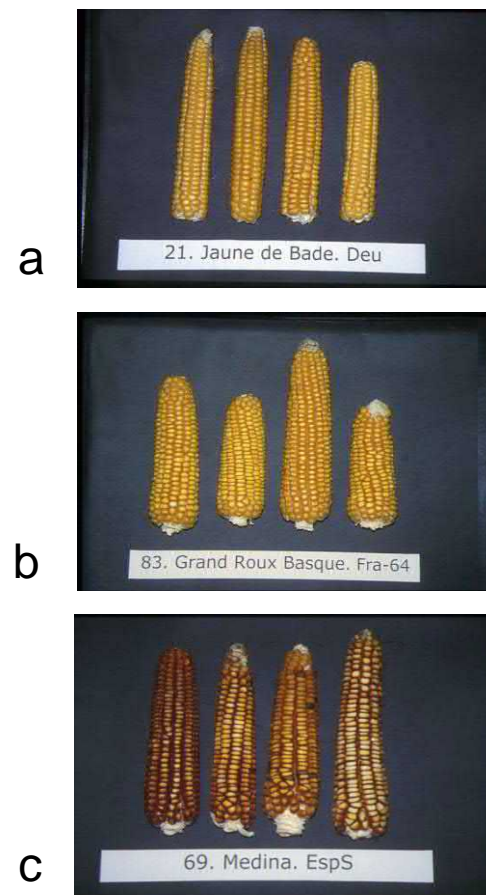
PCA1 is determined by American and European Northern Flints, as opposed to tropical material



Marker and history based scheme for Maize migration / introduction into Europe (West European perspective)



Tenaillon et Charcosset, 2011, from Rebourg et al., 2003; Dubreuil et al. 2006; now revised in Brandenburg et al., 2017



Traditional European population varieties (OPVs) essentially flint (vitreous endosperm)

Importance - Rationale

- European collections preserve highly original Genetic Resources, mostly in the form of
 - Landraces
 - Inbred lines (from a range of breeding generations)

- Of high interest for users
 - Scientific studies (evolution, association genetics, etc.)
 - Direct cultivation (Landraces)
 - Enriching diversity of elite breeding pools (target traits)

- In the context of increasing interest/concern for
 - Maize as food (functional food, gluten free, ...)
 - Organic agriculture increase (Landraces possible option)
 - Pesticide reduction (early plant cycle)
 - ...

Importance - Rationale

- Value for users would be increased by
 - More global / easier vision of collection contents
 - Improved evaluation/access to information for traits of interest
 - “Sociocultural” information (past uses, etc)
 - Original Landrace diversity available through inbred lines
 - ...

Expectations (propositions)

- Create a community
 - Know better accessions maintained in other collections,
 - Crop history and uses across countries
 - Know-how exchange and transfer
 - Harmonization of protocols, development of common minimum descriptors,

- Optimize use of resources
 - Identification of duplicated efforts (positive if back-up)
 - Repartition of maintenance, safety back-ups

Expectations (propositions)

- Identify short term cooperation opportunities
 - Scientific opportunities by data sharing (eg. enrich the genotyping portrayal of collections?)
 - Creation of core collections for particular traits, that will include collections from Western and South-East Europe

- Discuss new actions
 - Harmonization of users' access to information
 - Common evaluation actions, like EVA (See Lorenzo Maggioni's presentation)
 - Search for support / cooperation with third parties (eg. Private partners, through Promais?)
 - ...

Information on INRA-Promaïs partnership on genetic resources

- Pro-Maïs association started in 1969 under the leadership of JP. Monod and A. Cauderon to promote private-public cooperation in maize genetics/breeding (25 companies, now 9)
- Genetic Resources Network initiated by A. Gallais and J.-P. Monod, managed jointly by INRA and Pro-Maïs since 1983:
 - ✓ INRA contributes to multiplication (Saint-Martin), is in charge of keeping the resources in two cold chambers (security) in Montpellier: 4°C short term and – 20°C long term. INRA manages also the database SIREGAL (next slide) and distribution
 - ✓ Pro-Maïs members contribute to multiplication (approx. 2/3) and finance research projects about maize genetics, history and breeding.



A. Cauderon
(INRA)



J.-P. Monod
(Promaïs)



A. Gallais
(APT-INRA)

Information on populations available on Promaïs website

Préservation des ressources génétiques et recherche scientifique sur le maïs

PROmaïs
ASSOCIATION POUR L'ÉTUDE ET L'AMÉLIORATION DU MAÏS

L'association Programmes de recherche Ressources génétiques Variétés de pays Histoire et sélection du maïs

Une association dédiée à la génétique du maïs

La conservation des ressources génétiques du maïs

Le maïs et les hommes une longue histoire de culture et d'amélioration

Des programmes de recherche sur la biodiversité du maïs

273 variétés anciennes de maïs accessibles à tous

PHOTOTHÈQUE AGENDA CONTACT MENTIONS LÉGALES ACCÈS MEMBRES






PROmaïs
ASSOCIATION POUR L'ÉTUDE ET L'AMÉLIORATION DU MAÏS

L'association Programmes de recherche Ressources génétiques Variétés de pays Histoire et sélection du maïs

Variétés de pays > Variétés de pays françaises

Les variétés de pays françaises

Introduction
Variétés de pays françaises
Populations pyrénéennes
Recettes du pays

Nom dans la collection	Lieu de collecte	Dpt.	
Ain		01	
Aleu	Aleu	09	 
Allasac	Allasac	19	
Alsace.1		68	
Alsace.1AF		68	 
Alsace.2		68	
Alsace.3		68	 
Argein	Argein	09	  

LE MILHAS



Pour 4 personnes

Temps de cuisson : 5 min

Le *milhas* (prononcer "millasse") se prépare comme l'escauton gascon, parfois il s'enrichit d'œufs, de zeste de citron et prend alors dans le Tarn le nom de *milhassina*.

- 200 g de farine de maïs, 1/2 l de lait
- 1 cuillerée à soupe d'eau de fleur d'oranger
- 2 cuillerées à soupe de saindoux
- gelée de groseilles ou 2 cuillerées à soupe de sucre

Faire bouillir le lait, ajouter une cuillerée à soupe de saindoux et verser en pluie la farine en remuant avec la *todelha* (petit trident de bois) ou au fouet pour éviter les grumeaux. Attention aux éclaboussures brûlantes !

Incorporer l'eau de fleur d'oranger sans cesser de remuer à feu doux pendant un bon 1/4 d'heure.

Verser la préparation sur 4 centimètres d'épaisseur dans un moule rectangulaire fariné. Attendre le complet refroidissement, renverser sur un torchon et découper les morceaux.

Faire frire dans une poêle graissée au saindoux et servir chaud avec de la gelée de groseilles ou du sucre.

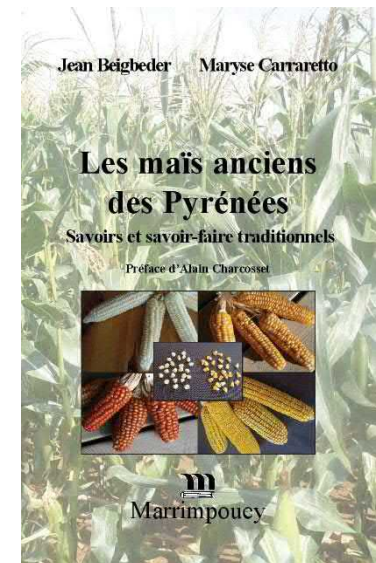
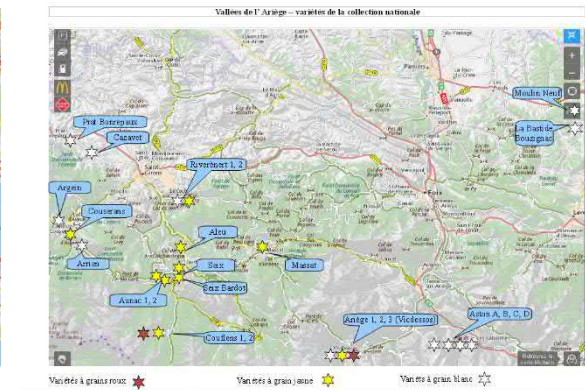
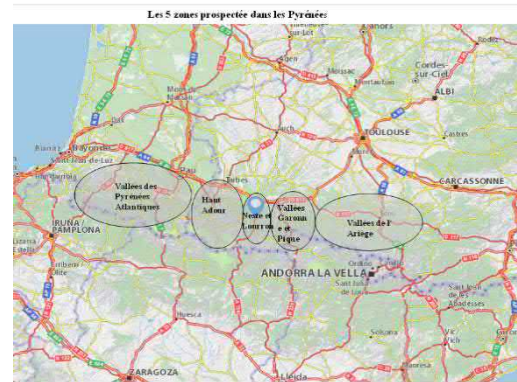
Completed by an ethnobotanical survey of the Pyrenean valleys conducted by Maryse Carraretto

Interviews in 2012-2013 of 73 women and men having been involved in traditional varieties cultivation and use in locations of origin of the accessions maintained (70 to 93 years old)

- ✓ Maize cultivation methods
- ✓ Seed reproduction, introductions, conformity of collection samples
- ✓ Use for food and feed
- ✓ Transition to hybrids
- ✓ Free expression



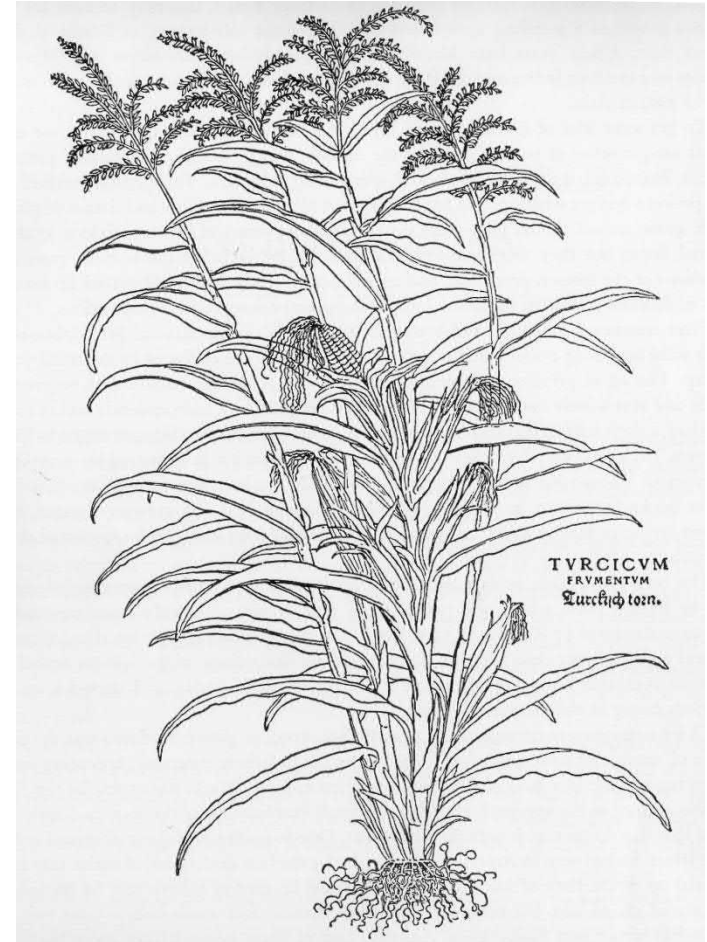
Synthesis with local language lexicon available on website, book by M. Carraretto and J. Beigbeder



Research projects

- Participation of Promaïs members on a voluntary basis (generally 6-9 / 9)
 - INRA labs: staff and infrastructure
 - Promaïs members: field experiments, genetic materiel development, consumables for work at INRA, temporary staff
 - Supported or not by external funding (CTPS, EU for RESEN88)
- Main topics covered:
 - genetic diversity analysis at molecular and phenotypic levels: Populations sources (PPS) puis PPS2 et PPS2C, Diversité corné 1, 2, 3, RESGEN88, diversité Zea
 - breeding methods (pre-breeding): “Piémont Pyrénéen”, valorisation ressources génétiques”
 - Breeding methods (marker assisted): SAM, SAMMCR 1, 2.
 - study of quality and adaptive traits

**Thank you for your
attention and
contributions**



First maize illustration by Europeans 1542,
Germany. Fuchs, « *de historia stirpium* »,