

# Cauliflower and Cabbage participatory breeding in Brittany

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## 10th Organic Seed Growers Conference

Utilization of Agrobiodiversity: breeding for diversity, resilience,  
and *in situ* genetic conservation

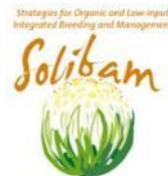
**February 12-15, 2020 | Corvallis, Oregon**



Horizon 2020 Research  
and Innovation program  
under Grant Agreement n.  
773814 (2017-2020)



Horizon 2020 research and  
innovation programme  
under grant agreement No  
633571 (2015-2019)



FP7 research and innovation  
programme under grant  
agreement *FP7* *KBBE*  
245058 (2010-2014)



# Part 1: Cauliflower and Cabbage participatory breeding in Brittany

Véronique Chable - France



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# Some words about Brittany

- North of Brittany, specialized in vegetable production and mainly cauliflowers.
- The oceanic climate allows cauliflower/cabbage production in autumn, winter and spring.
- Since the end of the 19th century, Brittany has developed this production
  - which increased mainly since 1960
  - and then, at the end of the eighties, when the F1 hybrid types were generalized.



# Brittany and organic farming

- Even if Brittany underwent a great intensification of its agriculture in the second half of the 20th century, this region of France was involved in organic agriculture very early.
- With 2,730 farms involved in organic production, **8% of Breton farms are organic**
- Main activity of Breton organic farms (on 01.01.18): dairy cattle: 771 (28%), **vegetables: 655 (24%)**

# The beginnings in the years 2000

In Europe, when the EU Regulation 1452/2003 requiring the use of organic seed for planting went into force, organic seed professionals were not ready to fulfil the demand.

- In Brittany, a group of organic farmers and their organisations started to meet with researchers and to build Participatory Plant Breeding projects.
- for the Brassica species, most modern varieties did not fit to the principles of Organic Agriculture.

most seed companies have based the creation of F1 hybrid varieties of Brassicas (cauliflower, cabbage, broccoli...) on cytoplasmic male sterility (CMS).





# The PAIS

Plateforme Agrobiologique  
d'Initiative Bio Bretagne à Suscinio



- Created in 2000
- First PBB program in 2001 for organic cabbages and cauliflowers in 2001.
- The aim was to include all concerned actors (farmers, processors, traders, trainers, researchers...) in defining the objectives and the means to reach them.



6 hectares of open field  
and 800 m<sup>2</sup> of plastic greenhouse





# Genetic resources evaluation

Breton Brassica landraces stored in 1983 at INRA, thanks to an European program supported by ECP-GR (*European Cooperative Program for Crop Genetic and Resources Networks*).



Evaluation of landraces of autumn and winter cauliflowers, and some local cabbages

- from Genebanks INRA Rennes
- from HRI Wellesbourne (UK), CGN Wageningen (NL), GEVES (France), and breeders



# Creation of Kaol kozh in 2007

Jean-Martial and  
Gwénoélé will tell  
the story just after

**Kaol  
Kozh**

pour le développement de  
la biodiversité en Bretagne

Un patrimoine vivant,  
les semences en héritage

Ur glad bev, un had da hêrezh



# 2000 – 2020 : All Brassica actions

## Evaluation of genetic resources

- Re-Discovering of our patrimony
- Exploring other forms/landraces of Brassica



## Selection and adaption of landraces

- Modifying few characters (colors, size, earliness, homogeneity)



## Creation of new types

- The “bricoli” of Kaol kozh



# The “bricoli”

The idea: a good broccoli easily recognizable for organic farmers

Should associate:

- ✓ Good taste of sprouting broccoli
- ✓ Easy to harvest
- ✓ Good local adaptation
- ✓ And specific color

Ten years selection

Begun with SOLIBAM (EU project)

And was finalized by one farmer of Kaol kozh

# LES PARENTS



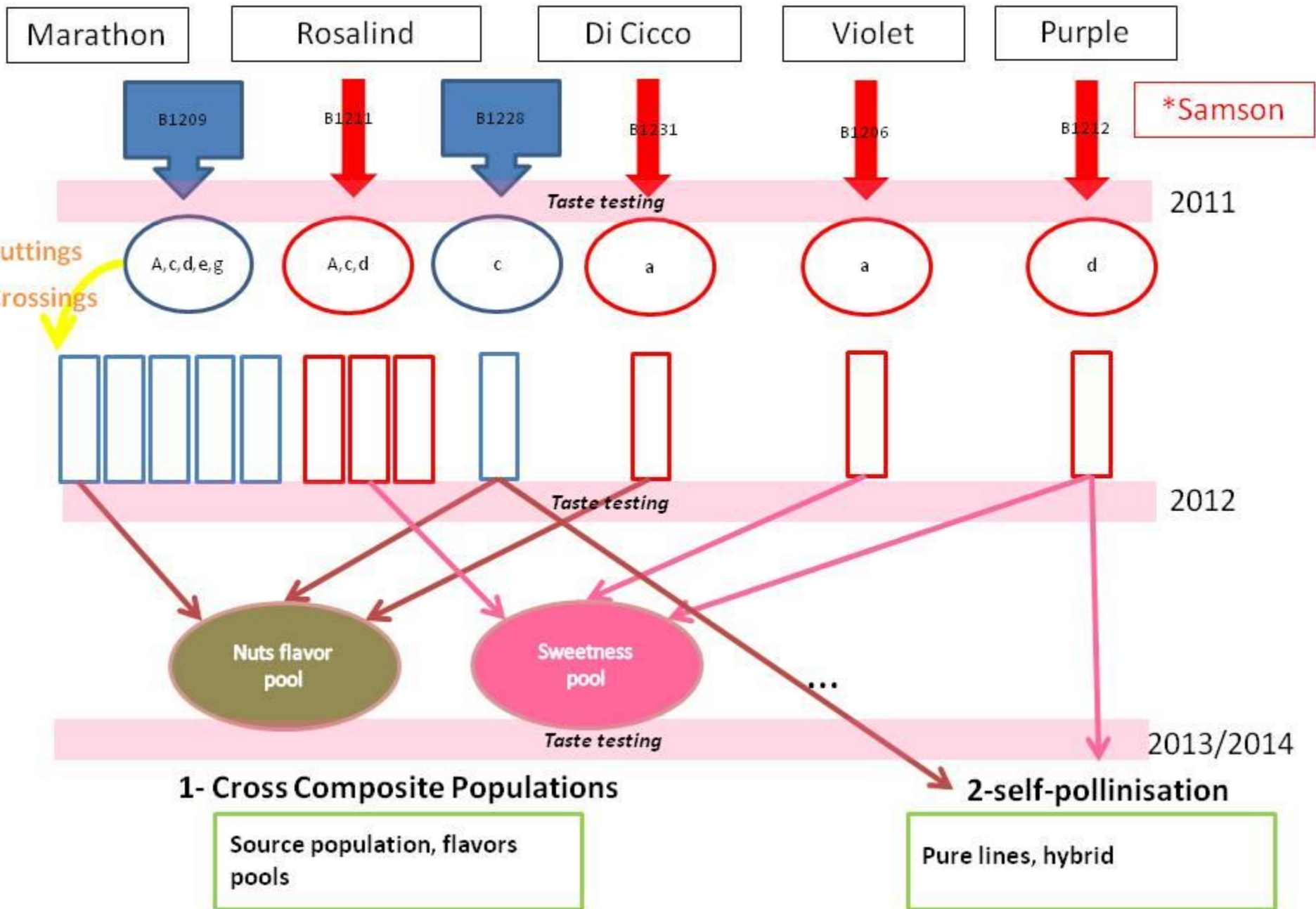
Brocoli à jets  
'Di Cicco'

Pomme ronde et verte  
'Marathon'  
'Samson'



Pomme ronde et violette  
'Purple cape'  
'Rosalind'  
'Viola'

# SOLIBAM Breeding strategy: Broccoli





Taste testing

2013/2014

# 1- Cross Composite Populations

# 2-self-pollinisation

Source population, flavors pools

Pure lines, hybrid

Plouescat – West Brittany

Chavagne – East Brittany

Eyragues – South of France



On-farm breeding

Mass selection

Gautier Semences: trials with 4 lines and 15 F1 Hybrids



No more news for the seed company

No seeds at Jean-Martial farm

2019



Creation of the "bricoli" at René Léa's farm Sold on farm and for restaurants

# 11 December 2019: a star of Europe

**HORIZON 2020**  
PROGRAMME DE RECHERCHE ET  
D'INNOVATION DE L'UNION EUROPÉENNE

• LAURÉATS  
DES ÉTOILES DE L'EUROPE

MENTION SCIENCE OUVERTE



Chou  
de  
Lorient

French  
Minister of  
research

The  
"bricoli"

#HorizonEU #EtoilesDeLEurope

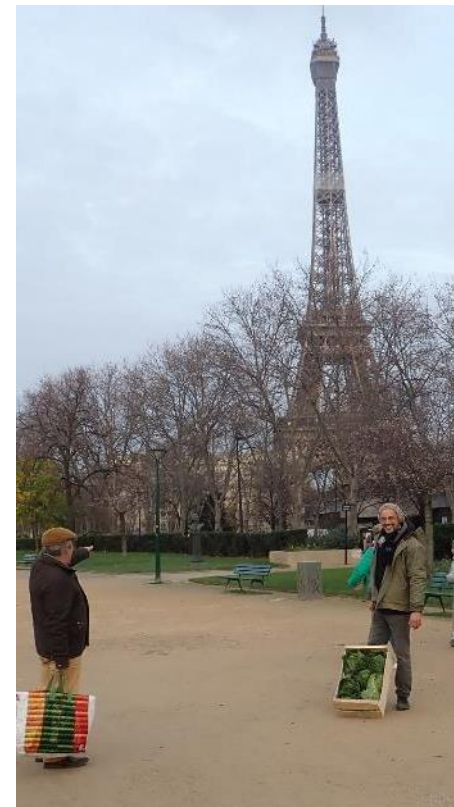




Our participatory research:

plants  
farmers  
and researchers

shares all objectives and actions



# Part 2: Brassica breeding in a network and the story of Kaol Kozh

Jean-Martial Morel, Gwénolé Leroy, Véronique Chable

**Kaol  
Kozh**

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# In Brittany (France) since 2007

Kaol  
Kozh

Association KAOL KOZH

Un patrimoine vivant, les semences en héritage

A living patrimony,  
seeds as a heritage



# The members

Gardeners,  
Citizens  
associations...

**Kaol  
Kozh**



COOP BIOBREIZH  
– long supply chain

Vegetable growers selling on-  
farm, in CSA, or local shop

**About 200 members**  
**All forms of marketing are represented**

# What are doing Kaol Kozh?

- Experimentation
- Multiplication and dissemination of seeds
- Looking for adapted machinery and sharing equipment
- Training and communication
- Setting of a collective place for our « Community Seed Banks »
- Management of the mention « Légume issu de Semence Paysanne » (*Vegetable from peasant seed*)

- *Expérimentation variétale*
- *Multiplication et diffusion des semences*
- *Mutualisation de matériel*
- *Formation et communication*
- *Création de Maisons des Semences Paysannes*
- *Gestion de la mention*

Kaol Kozh is managing a mention « Légume issu de Semence Paysanne »



**Vegetable grown from  
peasant seed**



30 candidate farms

Committee of evaluation

Attribution of the mention « Légume issu de Semence Paysanne »



COOP BIOBREIZH

Direct selling  
CSA/Amap

Local stores

Local marketing

Biocoop

Organic chains

Long distribution channels

Carrefour  
BioBreizh



# Experimentation, plant breeding and seed production on several species over whole Brittany



“ZAD” (in memory of the farmers and activists who have defended the place of Notre Dame des Landes also named ZAD (Area to defend) as the peasant seeds.



# Brassica, example 1: Exploring a collection at Chavagne

- From INRA genebank: a collection of best open pollinated varieties from the 70's stored in 1983
- A collection of 65 cultivars, very diverse and original







Pointed head  
Savoy cabbage



Large stalks  
kale (similar  
to chard)



Chou de Pontoise



Baccalan cabbage of Rennes



- Choice of original 7 cultivars adapted to local production
- Collective organization for the first multiplication before mass selection
- Multiplication based on 20 to 50 plants on 7 farms,
- Then mass selection to adapt to new environments and for quality



**Now, two exploitation channels:**

- Pontoise cabbage sold by Agrosemens, a seed artisan
- And circulation within KK members and other vegetable growers



Early cabbages  
(bacalans, douarnenez...)

# Brassica, example 2: Chou de Lorient (Lorient cabbage)



- Plant breeding to modify the size of a traditional cabbage “Chou de Lorient”
- formerly used to supply, in winter, the sauerkraut manufacturers of Alsace: it is a large cabbage (15kg)
- some farmers succeeded to reduce its size to be sold to families to be cooked or in salads,
- it is softer and sweeter than many other cabbages on the markets.
- To reach these aims, farmers use mass selection, directly in traditional cultivars



# A mass selection

- 15 to 30 plants
- Seed production in plastic greenhouses
- Re-plantation from field to greenhouse after selection OR production of cuttings on mother plants







Thanks for  
your  
attention





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organic agriculture  
inspires life\*

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**CAPITAL OF BRITTANY**

**OUR**  
**CONGRESS**  
**IN CITY CENTRE**  
**IN**  
**LE COUVENT**  
**DES JACOBINS**

