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
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
• 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 m² 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 Gwénolé will tell the story just after
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’
**1- Cross Composite Populations**

- **Source population, flavors pools**

**2-self-pollinisation**

- **Pure lines, hybrids**

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**Plouescat – West Brittany**

- On-farm breeding

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**Chavagne – East Brittany**

- PAIS

- Mass selection

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**2014**

- Gautier Semences: trials with 4 lines and 15 F1 Hybrids

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**Eyragues – South of France**

- 2014

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**2015 and 16**

- No seeds at Jean-Martial farm

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**2019**

- Creation of the “bricoli” at René Léa’s farm

- Sold on farm and for restaurants

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No more news for the seed company
The inclusion of Organic Heterogeneous Material (OHM) in the new Organic Regulation will however enable certification of genetically heterogeneous seeds via organic certification. OHM has a broader definition than that of heterogeneous cultivars within 2014/150/EU, with no quantitative limitations and covers all crop species. In the new Organic Regulation (EU 2018/848, Article 3 (18)) OHM is defined as follows:

"'organic heterogeneous material' means a plant grouping within a single botanical taxon of the lowest known rank which:
- presents common phenotypic characteristics;
- is characterised by a high level of genetic and phenotypic diversity between individual reproductive units, so that that plant grouping is represented by the material as a whole, and not by a small number of units;
- is not a variety within the meaning of Article 5(2) of Council Regulation (EC) No 2100/94;
- is not a mixture of varieties; and
- has been produced in accordance with this Regulation."

The spirit of OHM is to provide routes to market for more genetically diverse cultivars, that does not need to comply with DUS (Distinctiveness, Uniformity and Stability) or VCU (Value for Cultivation and Use) testing nor seed certification processes. It aims to follow a simple notification process that does not present an administrative or financial barrier to smaller breeding initiatives and individuals e.g. farmers.

11 December 2019: a star of Europe

French Minister of research
The “bricoli”
Chou de Lorient
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

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In Brittany (France) since 2007

Association KAOL KOZH
Un patrimoine vivant, les semences en héritage

A living patrimony, seeds as a heritage
The members

About 200 members
All forms of marketing are represented

Gardeners, Citizens associations...

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

Kaol Kozh

COOP BIOBREIZH – long supply chain
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 »

Direct selling CSA/Amap

Local stores

Local marketing

Long distribution channels

COOP BIOBREIZH

Carrefour BioBreizh

Organic chains

Biocoop
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
Chou de Pontoise

Pointed head
Savoy cabbage

Large stalks
kale (similar
to chard)

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
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.
Our Congress in City Centre in Le Couvent des Jacobins

From its Roots
Organic agriculture inspires life

21 – 27 September 2020

Rennes, Capital of Brittany

Organic World Congress

OWC2020 | France